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## ORIGINAL ARTICLES

### THE THERAPEUTIC USES OF CARBON DIOXIDE\*

#### A Summary of Its Present Uses in Medicine and Surgery

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#### I. INTRODUCTION

Prior to 1920 the therapeutic uses of carbon dioxide had been practically limited to effervescent table waters, carbonated baths, and carbon dioxide snow. In that year Henderson and Haggard<sup>1</sup> first made use of its action as a respiratory stimulus, employing it to eliminate carbon monoxide from the blood through the lungs. From that time the application of this principle was rapidly extended to the removal of volatile toxic compounds in general from the body and also to the treatment of many types of respiratory depression.

It is our purpose in this paper to give a résumé of the present therapeutic status of carbon dioxide, especially in connection with the advances made during the past seven years in its employment as a respiratory stimulus.

#### II. PHYSIOLOGY

A detailed account of the physico-chemical behavior of carbon dioxide in the body need not be undertaken here, but the main points which have a direct bearing on its therapeutic use will be reviewed.

It is still open to discussion whether carbon dioxide is the true respiratory stimulus, but it is a well-known fact that a rise in its tension in the blood is accompanied by an increase in the rate and depth of respiration. An increase in this tension may be brought about by breathing air rich in carbon dioxide, by slowing the respiration, or by holding the breath. Obviously, the first of these methods is the only one capable of increasing the elimination of volatile drugs. Voluntary over-breathing, in the case of a conscious and coöperative patient, might eliminate these compounds if it did not also lower the carbon dioxide tension and thereby eventually act as a depressant of the respiratory centre. Any over-breathing is usually followed by a period of apnoea or, if persisted in too long, by the symptoms of tetany.

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In Figure I is shown the response found by Scott<sup>2</sup> in normal people in the inhalation of varying percentages of carbon dioxide in inspired air. It should be emphasized that in certain pathological conditions the level of carbon dioxide in the alveoli may vary widely from the normal—e. g. in morphine over-dosage, where the respiratory centre is depressed, the tension

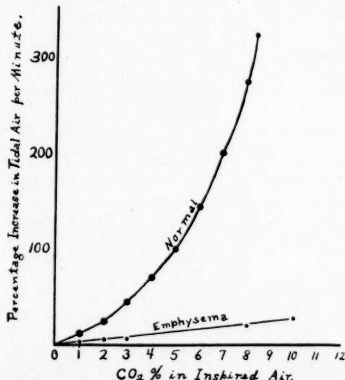


FIGURE I. Graphs reproduced from Scott<sup>2</sup> showing response of normal individuals to varying percentages of carbon dioxide and diminished reaction found in patients with emphysema.

of carbon dioxide in the alveolar air will be high; whereas in carbon monoxide poisoning, it is very much decreased. In either case a sudden increase of the carbon dioxide tension above its preëxistent level will produce the desired increase of respiration. Peabody<sup>3</sup> showed that in cases of cardiorenal disease presenting some degree of acidosis the respiratory response was about twice that found in normal subjects. Scott<sup>2</sup>, on the other hand, found that in emphysema, where one usually finds a high alveolar carbon dioxide tension, there is little, if any, response even to mixtures of ten or eleven per cent. of CO<sub>2</sub>. (See Figure I.) The exact nature of these phenomena is not understood.

Inhaling a concentration of carbon dioxide, sufficient to produce a marked increase in both the rate and depth of respiration, causes no disagreeable sensation beyond a slight fullness in the head. There is a slight rise in the pulse rate and blood pressure—up to from 15 to 20 points in each. We have never seen any deleterious effect from inhaling moderate concentrations of the gas in a suitable case.

There seems to be a prevalent misconception that cyanosis following anaesthesia, brain trauma, and depressant drugs is due to an increased amount of carbon dioxide in the blood and that, therefore, it should not be given to patients with a poor color. This is incorrect, as the blue color is due entirely to a lack of oxygen, not from displacement by carbon dioxide but, on the contrary, from inadequate respiration. Therefore, when carbon dioxide is given, larger quantities of oxygen reach the lungs and the blue color disappears.

It should be stated at this point that for stimulation of respiration we have used atmospheric air enriched with enough carbon dioxide to produce the desired degree of hyperpnea (about 5% as a rule). If the patient is made to breathe deeply, there is no need for adding oxygen to abolish cyanosis. Only in cases of poisoning by carbon monoxide is it necessary to give a mixture of carbon dioxide in oxygen and in this instance it is for a specific reason, as shown below.

### III. THERAPEUTIC USES OF CARBON DIOXIDE AS A RESPIRATORY STIMULANT

#### 1. Resuscitation from carbon monoxide or illuminating gas poisoning

The lethal action of this gas is brought about by lack of oxygen due to the combining of carbon monoxide with hemoglobin; this combination renders the hemoglobin incapable of giving up its oxygen to the tissues or of uniting with oxygen in the lungs. As a result of this anoxemia there is first a period of over-ventilation, with a great loss of carbon dioxide and lowering of its tension in the alveoli and blood<sup>1</sup>. This is followed by a depression of respiration and a generalized depression of all the body functions. When a severely gassed patient is left alone, cerebral oedema soon develops from the chronic anoxemia of the brain<sup>1</sup> and, as a result, the period of respiratory depression may continue long after the blood has returned to normal. Such a patient, even if he survives the initial asphyxiation, is very liable to die of pneumonia. It is, therefore, imperative to increase pulmonary ventilation by carbon dioxide and to raise the partial pressure of oxygen, as the latter causes a more rapid dissociation of carbon monoxide hemoglobin into the normal form which is capable of transporting oxygen. (See Figure II.)

If the patient has stopped breathing, it is first

necessary to start it again by artificial respiration. Once this is accomplished, a mixture of 95% oxygen with 5% carbon dioxide should be given. This latter is sufficient to augment the volume of respiration five to six times. This treatment is conveniently administered by the "H & H" inhalator (put out by the Bureau of Mines Appliance Co.). Inhalation should be kept up until recovery is well established—30 to 40 minutes in the ordinary cases of coma of short duration. If the apparatus is on hand from the beginning, the mask is best held over the patient's nose and mouth while respiration is started by the "prone pressure" method.

Most cases treated in this manner have shown a surprisingly rapid recovery with the minimum

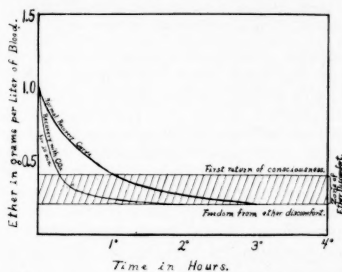


FIGURE II. Graphs reproduced from article by Henderson and Haggard<sup>3</sup> to show the rate of elimination of carbon monoxide from untreated patients, patients inhaling pure oxygen for 30 minutes and in cases given 5% CO<sub>2</sub> in 95% O<sub>2</sub> for 30 minutes.

of headache and other disagreeable symptoms. The primary mortality and secondary incidence of pneumonia have both been much lower than cases treated by any other procedure<sup>1</sup>.

#### 2. De-etherization of patients after operation.

Since the original article by Yandell Henderson, Haggard and Coburn<sup>4</sup> on de-etherizing patients with carbon dioxide inhalations, carbon-dioxide therapy has become of increasing value in anaesthesia. In 1923 a report was made by one of the writers<sup>5</sup> upon a series of 41 etherized patients treated with a mixture of carbon dioxide and atmospheric air, using a slight modification of the apparatus recommended by Henderson, Haggard and Coburn. The exact percentage of the carbon dioxide administered was not fixed, but its concentration was pushed to the point of producing a moderate hyperpnea (about 5% CO<sub>2</sub>). This brought about a return of consciousness which was from three to five times more rapid than in untreated control cases and also a moderate reduction in the incidence of post-anaesthetic nausea and vomiting.

Further experience with this method has shown that, although the first stage of recovery is much more rapid, the period from the first return of consciousness to complete freedom



from ether discomfort is not correspondingly improved. This is due to the shape of the de-etherization curve. (Figure III.) These curves show that the greatest elimination of ether from the body occurs right after its administration is stopped, while the lower concentrations of ether are eliminated very slowly. With carbon dioxide increasing the volume of pulmonary

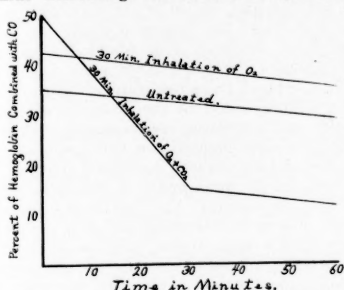


FIGURE III. Graphs showing average rate of elimination of ether in ordinary post-operative cases and in patients given CO<sub>2</sub> in air for 20 minutes. This figure shows that although the first return of consciousness is much more rapid in the treated cases, the period of ether discomfort is not correspondingly shortened. From determinations made by one of the authors. (J. C. W.)

ventilation from four to six fold, the first part of the curve falls with even greater rapidity; but as the patient begins to awaken he is sure to be non-coöperative and to resist the further administration of carbon dioxide. When this is stopped, the respiratory volume immediately falls and the further elimination of the anaesthetic is no more rapid than in the untreated patient. For this reason the routine use of carbon dioxide inhalation, after the administration of ether by the open method, has been discontinued, as it involves a cumbersome piece of apparatus and keeping the patient in the operating room 20 to 30 minutes longer than necessary. With the newer types of machines for giving anaesthesia by the closed method, however, carbon dioxide can be administered so simply and quickly, that a limited use of it has been resumed with good effect. (See section 3.)

### 3. Induction of anaesthesia and other uses during operation.

Following the general adoption of ethylene in anaesthesia, there has been a great improvement of apparatus for the administration of volatile anaesthetics by the closed method. The most modern of these appliances carry cylinders of carbon dioxide and oxygen in addition to ethylene, nitrous oxide, and an apparatus for giving ether as well. This has greatly increased the value of carbon dioxide, which can now be used to give a smooth and rapid induction of anaesthesia in a struggling patient or in one who persists in holding his breath. When an adequate amount of carbon dioxide is administered to the patient along with the anaesthetic, he simply can-

not help taking it in long, deep breaths. During the operation anaesthesia can be rapidly deepened or lightened by simply giving the patient a mixture of carbon dioxide and oxygen with or without the anaesthetic. This has been clearly described by Lundy<sup>6</sup> in a resumé of the use of carbon dioxide at the Mayo Clinic. He also tells us that at the end of operations where the anaesthetic has been given by the closed method, a mixture of carbon dioxide and oxygen is administered while the dressing is being applied without in any way prolonging the patient's stay in the operating room. The resulting five minutes of increased breathing is sufficient to eliminate a greater part of the anaesthetic, if it is ether, and nearly all of it, if it is nitrous oxide or ethylene. This is of sufficient benefit to make the routine use of carbon dioxide in this manner seem well worth while.

### 4. Resuscitation from alcoholic intoxication

Alcohol, like ether, is eliminated through the lungs; although, being less volatile, it is less rapidly exhaled and a larger part of it has to be removed through other channels. Also like ether, in an overdose, it causes a diminished respiratory volume, or even death from respiratory failure.

Hunter and Mudd<sup>7</sup> have reported good results in hastening the recovery of intoxicated individuals with carbon dioxide. They treated patients in varying degrees of intoxication, from a mild stupor to deep coma with a thready pulse and marked respiratory depression. Three cases first seen in deep coma were all conscious after 30 minutes of inhalation and quite rational after 15 to 30 minutes additional treatment. Furthermore all of them commented the next morning on the unusually mild symptoms of the expected "hang-over."

In some further recent investigations, Hunter<sup>8</sup> has determined the blood alcohol concentrations. In two untreated cases of alcoholic coma the blood alcohol fell approximately 4.5% during the first hour and the man remained comatose. Three similar patients given carbon dioxide in halations for 30 minutes regained consciousness within an hour and the blood alcohol concentration determined at the end of this period had fallen approximately 12%.

Hunter notes that patients who are only mildly intoxicated are not correspondingly benefited. This would seem to coincide with White's observations on de-etherization<sup>9</sup>, where high concentrations of ether are eliminated with great rapidity, while lesser amounts leave the blood much more slowly. This treatment, therefore, is of real value in cases of deep coma where death may follow from respiratory failure of a secondary pneumonia.

### 5. Combating respiratory failure after overdoses of depressant drugs.

In morphine poisoning, as is well known, the respiratory center is profoundly depressed. Al-

though the carbon dioxide tension is unusually high, the center still seems to respond well to an increase of it in the inspired air. In the few rather mild cases of morphine over-dosage which we have treated, it has been easy to maintain adequate respiration by its use. It should be of great help in a patient who, for any reason, is too sick to stimulate by forcing him to walk about. It has been used successfully by one of the writers in a case of veronal poisoning after gastric lavage had failed to restore the patient. There seems to be no reason why its use cannot be extended to any type of poisoning where respirations are depressed and reach a dangerously low level.

#### 6. Treatment of hiccoughs.

Giving a patient with prolonged attacks of hiccoughing a period of vigorous hyperpnea by means of carbon dioxide inhalations was first tried in this hospital by Sheldon<sup>9</sup>. In his article he reports in detail four cases of severe post-operative hiccough, all of which stopped after several periods of carbon dioxide inhalations that were resorted to after the classical remedies had been tried and failed. It has since been used in this hospital on a large number of patients suffering from hiccoughs. In practically every case it has given at least a transitory relief. In a great many, after two or three recurrences, the hiccoughing has been permanently stopped. When there has been a definite organic cause for the hiccough, such as wick pressing on the duodenum or approaching uremia, its benefit has been but short lived.

The mechanism of its action is not definitely known. Many cases of hiccough are due to irritation of the diaphragm following upper abdominal operation, diaphragmatic abscess, or pleurisy, etc. Afferent impulses reach the respiratory center via the phrenic nerve and an intermittent spasm of that muscle is set up by motor impulses along the efferent fibers of the nerve. It seems probable that a still stronger stimulation of the respiratory center may break this reflex arc and abolish the hiccough.

#### 7. Resuscitation of the new-born.

There being no maternity ward in this hospital, we are unacquainted with the obstetrical uses of carbon dioxide, and therefore quote directly from Lundy's<sup>8</sup> paper: "If the new-born infant does not breathe well, respiration may be established quickly by the use of artificial respiration and oxygen containing 5 per cent. of carbon dioxide." The mixture is given through a closed mask and with a positive pressure of 3 cm. of water. Lundy also recommends carbon dioxide inhalation with the anaesthesia during the severe bearing-down pains just before the head appears. He contends that this makes it impossible for the mother to hold her

breath and thus prevents her from pushing the head through too rapidly and causing severe lacerations of the perineum.

#### 8. Stimulation of respiration in cases of trauma to the respiratory center.

In a former article White<sup>5</sup> reported four cases, three following operation for tumor near the medulla and one in which a decompression was performed for fractured skull. In all of these there was such a profound depression of the respiratory center that the patient appeared to be moribund from respiratory failure. These cases all responded to the stimulus of carbon dioxide and recovered consciousness. Three of them gradually reached the point where a normal respiratory rhythm continued after periods of from one to three hours of intermittent carbon dioxide therapy, the fourth gradually relapsed into unconsciousness and died. An autopsy revealed a large tumor, only partly removed at operation, pressing directly on the medulla. In subsequent cases it has been interesting to note that Cheyne-Stokes respiration, treated with carbon dioxide, has often changed into normal breathing and that several patients, in whom an early respiratory failure was checked, have eventually recovered.

#### 9. Expansion of atelectatic lung by carbon dioxide.

The use of carbon dioxide as an aid to re-expansion of the atelectatic lung after thoracotomy for empyema was first described by Churchill<sup>10</sup>. Its beneficial action here is due to the mechanical effects of the greatly increased respiratory effort. With the vigorous inspiratory action, the negative pressure in the empyema cavity is augmented; while, with the complementary increase in expiration, the intrapulmonary pressure is also raised. Furthermore, the exercise of all the respiratory muscles helps to strengthen the whole thorax and thereby to minimize the scoliosis which so often results in permanent deformity. The patient can be easily taught to give himself frequent periods of vigorous respiration with any type of simple inhaler set to give a 5% mixture of carbon dioxide in air.

We believe this treatment to be of great value in the obliteration of large empyema cavities and, moreover, that it is quite harmless and not disagreeable to the patient. It should only supplement and not, by any means, replace the usual breathing exercises and blow-bottles.

#### IV. NON-RESPIRATORY USES OF CARBON DIOXIDE

Of the non-respiratory uses of carbon dioxide very little need be said. They are chiefly the carbonated waters and the so-called carbon dioxide or Nauheim baths. That the former have

a distinct use in the therapeutics is borne out by years of usage in the clinic and elsewhere. They are often an aid to the appetite and possibly the digestion, presumably by increasing peristalsis. In gastric catarrh, vomiting of pregnancy, and seasickness these waters may be invaluable. Here the beneficial effect is due to the bursting of the small bubbles of gas against the gastric mucosa, which acts as a mechanical stimulant and is in no way related to the respiratory effect of carbon dioxide. As to any other benefits of carbonated waters, they lie in all probability in the anti-acid or laxative action of the salts of the alkaline earths which they contain<sup>11</sup>.

Nauheim baths, still in vogue at bath resorts, have received less attention than formerly. They consist in spraying carbonated water against the skin and, by the mechanism described above, produce a certain degree of vasodilatation in the skin<sup>12</sup>.

With the increased usefulness of carbon dioxide when inhaled, proprietary firms (as is the case with all new therapeutic procedures) have seized upon the opportunity of advertising compounds containing carbon dioxide in any form by broadcasting the supposedly life-giving properties of this gas. It is well to be on one's guard against exaggerated and misleading claims and to remember that the respiratory stimulus of carbon dioxide can be obtained only through inhalation. Even if it were practical to administer large quantities of the gas by the gastro-intestinal tract, diffusion into the blood through the relatively small surface area of the mucous membranes would be so much more gradual than elimination through the tremendous area of the lung alveoli that its effect on the respiratory center would be nil.

# SUMMARY

(1) Any increase in the carbon dioxide of inspired air up to 10% will cause a corresponding increase in the pulmonary ventilation. We have used concentrations varying from 5% to 7%, as greater amounts cause labored respiration and strain on the circulatory system.

(2) We recommend its addition to the inspired atmospheric air for all purposes where a respiratory stimulant is desired.

(3) Only in resuscitation from carbon monoxide poisoning is it necessary to give it in oxygen rather than in atmospheric air.

(4) It is now proven of therapeutic value in the rapid elimination of volatile drugs, in stopping prolonged attacks of hiccoughing, in resuscitation of the new-born, and as an aid to the expansion of collapsed tissue.

(5) There are practically no contra-indications to its use in quantities necessary to produce moderate degrees of hyperpnea.

(6) It should be emphasized that its use is only to supplement, and not in any way to displace, other useful therapeutic procedures.

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## THE ACTION OF IODIDES ON THE NITROGEN METABOLISM\*

BY G. P. GRABFIELD, M.D.

SINCE the introduction of iodides into medicine, it has been observed that they have some effect on the nitrogen metabolism, although some of the earlier observers failed to note this effect. Of course, the action of iodine on the general metabolism in hyperthyroidism has been amply confirmed in recent years. Its effect on the guinea was early observed and originally thought to be specific. However, it has since been shown that this is part of its general effect on fibrous tissue<sup>14</sup> if the latter is placed so as to be accessible to the action of the drug. There are various explanations of the action of iodides on fibrous tissue, the generally accepted one being that of Jobling and Peterson<sup>1</sup>, who concluded that the action is due to a local inhibi-

tion of the antitryptic activity of the body. This may explain the way it acts in releasing nitrogen as will be indicated below.

The first observation on the action of the iodides on the nitrogen metabolism was made by Samoiloff<sup>2</sup> in 1886. Using large dogs, he showed that the total nitrogen excretion was increased by the administration of potassium iodide in large doses and also that the partition of nitrogen excretion between urine and feces was altered at the expense of nitrogen in the urine. He used enormous doses of potassium iodide. As will be shown, this change in the division of nitrogen between the urine and the feces may be an action due to the cation rather than an action of iodide itself. The work of Samoiloff was not confirmed by various men working, usually with syphilitics, in the next ten years<sup>3, 4, 5</sup>.

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It may be added parenthetically that iodine is a drug that is notoriously variable in its action. A possible explanation of this may be afforded when it is seen how this action occurs. Our experiments were initiated by the accidental finding, in the course of a routine blood analysis, of a very high non-protein nitrogen in the blood of three patients who were receiving potassium iodide. Studies<sup>6, 7, 8</sup> were then begun to explain this phenomenon and the outcome of these studies will be recapitulated here.

Human subjects without noteworthy physical impairments were used for this work. Most were patients with only slight mental symptoms. The basal metabolic rate and urine were normal in every case. Such patients were placed in the metabolism ward and fed a constant weighed diet of two-thirds of a gram of protein per kilo of body weight with adequate caloric content (2000 to 2500 calories per diem) to maintain them in positive nitrogen balance and without loss of weight. After the subject was found to be in balance, the drug administration was begun. The general experimental procedure was to give the drug selected for a period of three days and in divided doses, three times a day, after meals. The dosage corresponds roughly to doses commonly used in practice amounting to one gram (grs. xv) three times a day for the average man, but based upon the dosage of 6 milligrams of iodine per kilogram of body weight per dose.

The results of the experiments with various forms of iodine administration makes it convenient to discuss them in three groups, depending upon the cation with which the iodine was combined.

When sodium and lithium iodide were given in accordance with the procedure outlined above, there was an immediate increase in the nitrogen excretion amounting to 10 or 15%, which gradually tapered off on the third day. Corresponding to this there was a slight tendency for the non-protein nitrogen of the blood to fall.

After calcium or potassium iodides, on the contrary, there was no change in the nitrogen output in the urine during the three days of drug administration, but when the blood was examined during this period, a definite rise in the non-protein nitrogen of the blood was observed. This rise on a few occasions actually reached pathological levels, the highest recorded figure being 83 mgms. per 100 c.c. of blood. In the three days immediately following the drug administration the nitrogen excretion in the urine rose to about the same degree as was the case when sodium and lithium iodides were given.

A third group of experiments was done with the iodides of strontium and magnesium, "Sajodin" and "Lugol's solution." In a general way, as will be seen in the accompanying chart (Figure 1), the results of the administration of these drugs was followed by a comparable increase in nitrogen excretion at a time midway between the

two groups discussed in the preceding paragraphs.

So far, then, it is apparent that the administration of iodides causes an increase in the nitrogen excretion in the urine without any diuresis but that the time of this excretion differs according to the cation of the salt administered. We are, therefore, at this point, confronted with two problems, one of which concerns the mechanism and nature of the increased nitrogen excretion and the other concerns the effect of the cations on the time of nitrogen excretion. Inasmuch as iodine was the common factor involved in producing the nitrogen effect as distinct from the time element, the obvious thought that occurred to us was that this bore some relation to the thyroid. The simplest and most obvious explanation of this was that the administration of iodides stimulated the thyroid, which, in turn, increased the basal heat production and consequently the nitrogen excretion. A few experiments showed that this was not the case and confirmed the findings of Boothby and Rowntree<sup>13</sup> in their study of the action of various drugs on the basal metabolic rate. Inasmuch as there was no change in the basal metabolism (cf. Figure 2) we had to cast about for another explanation. At about this time a paper by Hesse<sup>9</sup> appeared confirming, in the dog, the work which we had done on humans. Hesse showed that this increased nitrogen excretion after the administration of sodium iodide occurred whether the drug was given by mouth or subcutaneously. He concluded that the thyroid had nothing to do with this action and, on the basis of histological evidence alone, concluded that iodides stimulated an activity in the liver. It seemed to us that the equally prompt effect of the drug given by mouth or by injection would tend to indicate that the liver was not immediately implicated in this action, although it might be secondarily so. We, therefore, repeated Hesse's experiments on dogs until we got two perfect experiments before and after thyroidectomy. Sufficient parathyroid tissue was left to prevent tetany. This was the stumbling block in Hesse's experiments as well as in ours. We found in our experiments that the increase of nitrogen excretion did not occur after the thyroid was removed<sup>10</sup>.

In the latter experiments we also studied the sulphur excretion in order to get a clue as to the nature of the nitrogen excreted. To our surprise, we found that in dogs the sulphur excretion remained constant in spite of the increase in nitrogen excretion. Stated in another fashion, we found that the extra nitrogen excreted following the injection of iodides was of the sort that does not contain sulphur. It is well recognized that the body contains certain gelatin-like substances which are protein in character but do not contain sulphur.

The increase in the non-protein nitrogen of the blood observed following potassium and calcium iodides gave us the opportunity to study

the partition of the nitrogen mobilized and excreted.

It was found<sup>7</sup> that the nitrogen partition in the blood and urine was not significantly altered

by the administration of iodides. In the light of subsequent studies, however, attention should be called to the fact that in the blood there seems to be a tendency towards an increase in

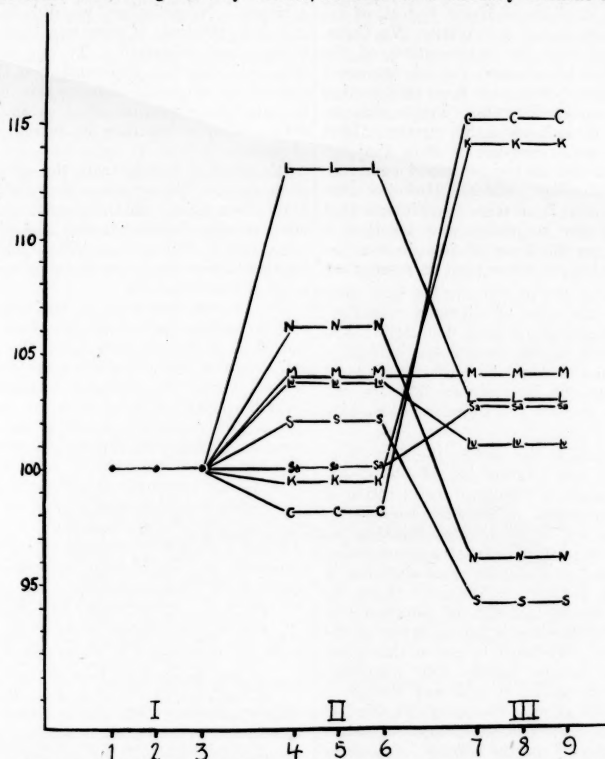


FIGURE 1. Shows the total urinary nitrogen excretion of cases treated with Lithium (L), Sodium (N), Magnesium (M), Strontium (S), Potassium (K), and Calcium (C) Iodides, "Lugol's Solution" (Lu) and Sajodin (Sa). The days charted are consecutive but divided into three groups of three days each. Only during the second period were the drugs administered. Excretion is plotted on a percentile basis, considering the pre-iodide period as 100 per cent excretion. Each curve represents the average of all the cases studied.

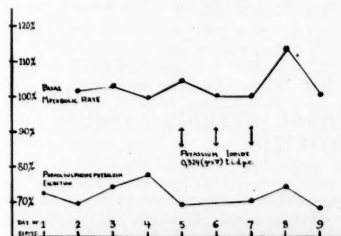


FIGURE 2. These curves show the percentage of the average phenolsulphonphthalein excretion (lower line) and average basal metabolic rate (upper line) of four patients observed daily for nine consecutive days. On the fifth, sixth and seventh days potassium iodide was given. The apparent rise in heat production on the eighth day is probably not significant.

the undetermined nitrogen during the administration of calcium and potassium iodides. The other figures run remarkably constant. It is evident from this portion of the work that there is no significant alteration in the fundamental nitrogen break-down and that we must search further to find out the source of this nitrogen.

The next experiments were done on dogs kept on a constant diet. The iodide, as sodium iodide, was injected subcutaneously for three-day periods similarly with the experiments on the human being. After one or more control experiments were completed, a thyroidectomy was attempted. In two dogs we were successful in removing the thyroid and leaving enough parathyroid tissue to enable the dog to live without



tetany. The rise in urinary nitrogen excretion, after the administration of the drug, observed in these dogs during the control periods did not appear after the thyroid was removed. This is contrary to the findings of Hesse, but all of his animals were said to have had tetany. We, therefore, concluded that the intervention of the thyroid seemed to be necessary for this increased nitrogen excretion quite apart from its function on the basal metabolic rate. There still remains the rôle of the liver in this matter. Hesse adduced histological evidence to show that the liver was concerned in the increased excretion of nitrogen following iodides. However that may be, it is evident from these experiments that the thyroid is also necessary and whether it works directly on the store of deposit nitrogen or through the liver is not settled at present.

This is as far as the present studies have gone in relation to the type of nitrogen excretion. The work on dogs has not been definitely transferred to humans as yet, though the indication is that this transfer could be logically made as previous experiments have shown that the sulphur excretion in dogs and humans is similarly controlled.

As to the effect of the cation, the first thing we investigated was whether the effects of calcium and potassium in delaying the excretion of nitrogen are constant or whether they occur only when these ions are combined with iodides. This is particularly important in that calcium chloride has been used as a diuretic and also that in some countries, notably in Ireland, where the national diet consists chiefly of potatoes, the daily intake of potassium is far in excess of the doses used here. We tried to get at this problem by giving sodium iodide with potassium chloride but were unable to note any change in the sodium iodide effect. Similarly, we tried to combine sodium chloride and potassium iodide without any change in the effects from those previously reported. We then turned to salicylates as offering another method of increasing nitrogen excretion and studied lithium, sodium and potassium salicylates particularly in regard to the time of the nitrogen excretion. While the effect of salicylates<sup>11</sup> on the nitrogen excretion has been much studied, we have shown that a different kind of nitrogen is involved from

that excreted after iodides. The nitrogen excreted following salicylates is accompanied by an increase in sulphur excretion and contains a disproportionately large percentage of uric acid nitrogen. Nevertheless, we did find that the law as to the time of excretion held for sodium lithium and potassium. To our surprise, calcium salicylate was apparently not absorbed, inasmuch as we could demonstrate no effect on the nitrogen excretion after exhibition of this drug, which is insoluble in ordinary quantities of water.

We tried to demonstrate the effect of potassium on the kidney more directly by making daily observations on the phenolsulphonephthalein excretion before, during and after the administration of potassium iodide (cf. Figure 2). By this test we were unable to show any impairment of renal function.

We have in this work so far, therefore, been able to isolate two problems. One of these is the effect of various cations on the renal nitrogen excretion; the other is a method of studying several types of increased nitrogen excretion from the body. Iodides cause an increased excretion of nitrogen provided the thyroid is present (dogs) and this is unaccompanied in the dog by an increase in sulphur excretion. This is consistent with the effects of thyroxin in myxedema so admirably studied by Boothby<sup>12</sup>.

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## THE ORTHOPEDIC CARE OF SEVERAL DIFFERENT FORMS OF CHRONIC ARTHRITIS

BY PAUL N. JEPSON, M.D.

CHRONIC ARTHRITIS and rheumatic disturbances in their various forms are caused by one or more of the same three factors, broadly speaking, that produce most bodily disturbances: infection, trauma, and senescent changes in tissue. Frequently all three factors may be operative in the same case.

Many different classifications of arthritis have been offered, most of which are unwieldy. It would seem that one which will at once suggest the appropriate treatment, that is, one based on the etiology, would simplify matters. Such a classification has been suggested by Hench: (1) infectious arthritis; (2) irritative arthritis (traumatic) and (3) senescent arthritis.

#### INFECTIOUS ARTHRITIS

In chronic infectious arthritis there are almost always several factors to be considered. There may be changes in the periarticular soft tissues, thickening of the synovial membrane, or destructive or hypertrophic changes in the bone. Certain clinical points may be noted: tachycardia is almost always present, usually the hands and feet are cold and clammy, blood pressure is low, some degree of anemia is manifest, and weight and strength have been lost<sup>8</sup>.

In uncomplicated cases of chronic rheumatic fever<sup>10</sup> there should be no loss of joint function, nor should chronic arthritis result. However, in some cases, if there has been undue trauma to one or more joints, arthritis may persist. This is seen in obese patients.

As soon as a diagnosis of chronic infectious

physiotherapy with his own simple, inexpensive apparatus.

The object of physiotherapy is to bring about increased flow of fresh blood to the part by local vasodilatation, and to increase the pulse rate in order to accelerate the removal of toxins and causes of infection. Instruction as to the aim and mode of application of this method of treatment should be given under the supervision of a competent physician; otherwise the patient will seek such help from the chiropractor or osteopath. A good instrument to use at home is an inexpensive cradle of carbon lights, usually called a baking-machine, which can be purchased for ten of fifteen dollars.

During the acute stage of the arthritic process, motion must be markedly restricted and the joints kept in the position of least deformity to

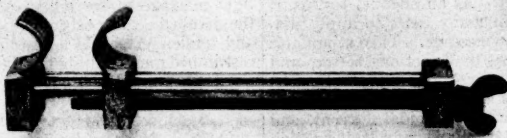


FIGURE 1. Spreading device for gradual straightening of casts (Flagstad).

arthritis is made, radical treatment is indicated since this type of arthritis is likely to cause progressive deformity. All primary foci of infection, such as teeth and tonsils, must first of all be removed, and if indicated, treatment of prostatitis or cervicitis begun. Even suspicious foci should be considered potential causative factors. Devitalized teeth must be removed on suspicion, for it has been found that they either are, or will become infected. Pyorrhea should be vigorously treated<sup>5-7</sup>. Latent prostatic infection may be revealed by the method used by von Lackum<sup>12</sup>. Moench and Walters<sup>9-11</sup> have found that infection of the cervix often plays an important role in chronic arthritis.

Many patients go from one physician to another, persistently searching for additional foci, not realizing that a well-developed inflammatory process in a joint may of itself act as a focus. The treatment for the metastatic infection, that is the joint lesion, is physiotherapy, but unless it is persisted in and applied rationally, haphazard results are to be expected<sup>4</sup>. For this reason, the patient must be taught how to carry on his own

allow the infection to localize. Later, when the acute symptoms have subsided, passive motion is instituted, followed as soon as possible by active motion. So often patients appear for treatment after the deformity has taken place, and the acute pain, swelling, and redness have subsided, with the idea that the orthopedic surgeon will be able to correct the deformity and restore function at once! This merely emphasizes the necessity of closer coöperation of the orthopedic surgeon with the family physician.

Prolonged support with pillows usually causes flexion deformity of the knees. It has been found that a good way to correct all but the slightest flexion deformities of the knees is to apply a plaster-of-Paris cast from the toes to the groin, making the plaster heavier in the region of the popliteal space. When the cast has dried sufficiently, usually from twenty-four to forty-eight hours later, the plaster is cut through behind the knee, and a spreading device inserted<sup>1</sup>. This device can be manipulated by the patient himself (Figure 1) and is so made that the leg may be gradually straightened from day to day. Casts

must not be left on for more than a week or ten days, or resulting limitation of motion may be great. When the leg has become entirely straight, another cast is applied with the leg in full extension, and is later cut into a half-cast, the posterior part of which is worn while the patient is in bed, especially at night, keeping the extremity in the corrected position. During the day a brace with limited knee motion is applied, which makes it possible for the patient to be up and around. If flexion deformity is allowed to recur, following the corrective casts, pain usually makes it impossible for the patient to walk in comfort; therefore, great care should be taken to maintain complete extension of the leg. For the correction of flexion deformities of slight degree only, physiotherapy together with Buck's extension apparatus may suffice. For those of greater degree, the corrective cast is more effective than Buck's extension apparatus in reducing the time and expense of hospital care.

For flexion deformities in the elbow and fingers, gentle and limited manipulation under an anesthetic may be attempted. Following this, a splint may be applied to maintain the corrected position. In this way almost complete extension is eventually secured. As an adjunct to this, it is found beneficial in many cases to apply diathermy followed by massage. This stimulates the extensor muscles to function better, and further tends to help correct the deformity. The deformities of hands and fingers are indeed discouraging. Diathermy, sinusoidal current, and massage must all be tried and may be beneficial. Before the patient is dismissed, he is given instruction in the application of baking and massage, to be carried on after he has left the hospital.

In cases of spondylitis deformans with flexion deformity, especially in young adults, diathermy applied for four or five days, followed by the pulsating sinusoidal current and massage, together with corrective exercises and occupational therapy, will often materially correct the deformity, ease the pain, and get the patient back to his regular duties more quickly than any other form of treatment. It is best to precede the above treatment by placing the patient on a fracture board for three or four days, adding then for ten days more hyperextension, obtained by placing a tightly rolled blanket between the mattress and the fracture board so that the roll will come at the apex of the patient's kyphosis. The entire course of treatment usually takes from three to four weeks. Instruction is then given the patient regarding the application of heat and massage, a steel back-brace or leather jacket is provided, and certain corrective exercises that can be carried out at home, including deep breathing, are outlined.

By educating the patient concerning the nature of his disease and the limits of medical and orthopedic treatment, his confidence and cooperation will be obtained. Only by such efforts may

we hope to lessen the deformities of arthritis. Occupational therapy, such as basket-weaving, the use of the loom, and knitting, as well as other methods such as the rowing-machine, which more properly comes under the department of physiotherapy, is desirable if it can be arranged.

The ability of the patient to forecast weather changes by variations in his pains shows the variable effect of climate on chronic arthritis. In general, a cold climate is not well tolerated and a warm, dry climate is best. Nevertheless, although warm climates may make patients feel better, they do not often cure the disease. Furthermore, although climatic conditions are considered a predisposing, rather than a direct cause of arthritis, it will be recalled that the earliest evidence of arthritis is found in the mummies of Nubian and other peoples of Egypt where the climate is never rigorous. However, if other measures fail, and if the patient is financially able, a prolonged stay in a warm climate may help to check the disease.

Summarizing, the treatment of chronic rheumatic arthritis consists of: (1) eradication of all foci of infection as soon as possible, (2) intensive light massage to the joints, (3) maintenance of the joints in the position of choice to forestall any tendency toward a residual deformity, (4) rest in bed and a suitable regimen for the cardiac symptoms, and (5) analgesics.

#### IRRITATIVE ARTHRITIS

The traumatic and static forms are usually associated with obesity, but they may be caused by carrying heavy loads, and so forth. The first measure in the treatment of this type of arthritis is to give a reduction diet, usually consisting of 1,000 calories. Support to the feet is almost always necessary and may be afforded by plates, orthopedic heels, or pads. The back and abdomen are best supported by a corset, belt, light steel brace, or leather jacket. If foci of infection are present, they should be eliminated.

Another type of traumatic arthritis is prepatellar bursitis, seen most frequently in housemaids and nuns.

*Gout.* Cardiac disease is not a manifestation of gouty arthritis. As shown by Nomland and Hench<sup>8</sup>, there are distinct types of renal insufficiency present in 40 per cent. of these cases. Therefore, arthritis associated with albuminuria and renal insufficiency should suggest gout. Tophi are usually present, and as a rule there is an increase in the blood uric acid. If one tophus is found and sodium urate crystals can be demonstrated in its chalky contents, the diagnosis is established.

The pathologic changes in gout are associated with the deposition of sodium urate crystals about the joints, usually in the fingers, toes, knees, and ankles, affecting first the cartilage, the capsule, and the periarticular structures. As the chronic irritation from the deposited uric

acid continues, destruction of cartilage and hypertrophy and destruction of bone may occur, and the symptoms of arthritis may then become chronic rather than recurrently acute. Surgical removal of these so-called tophi is disappointing; indeed, the removal of the tophi entails the destruction of so much of the surrounding tissue and structures that it is rarely advised. The best treatment is rest and hot dressings. When the toes and feet are affected the shoes may be modified, or plates provided in order to give correct balance to the foot.

#### SENESCENT ARTHRITIS

Heberden's nodes appear in the physiologically old patient and usually accompany senescent arthritis. There is no agreement as to the exact pathologic change in these nodes. Heberden spoke of them as "little hard knobs." Osler<sup>9</sup> describes them as "small bony outgrowths at the sides of the terminal phalangeal joints." Bradford and Lovett<sup>14</sup> suggest that the pathological manifestations are not constant.

In the first stage, there is usually swelling in the soft tissues of the index and fifth fingers. In the second stage, cartilaginous erosion and hypertrophy and lipping of bone are found. Pain is usually present. Senescent arthritis is commonly seen in the old, bent man suffering from spondylitis. Willis<sup>12</sup> found hypertrophic arthritis of the spine to be almost universal after the age of forty-five. Garvin<sup>2</sup> has shown that in a series of 2090 patients aged more than fifty, 67 per cent. of the men and 40 per cent. of the women were affected with this senescent spondylitis. In medico-legal cases it is important to recognize the presence of spondylitis in justice to the employer.

The etiologic factors in senescent arthritis are probably arteriosclerosis and repeated trauma. The prognosis as to incapacitating the patient is not a cause for worry. If the patient is willing to put up with the moderate deformity, no treatment is necessary. Eradication of foci is not indicated. Heat and massage may be applied daily, and contrast baths given; reassurance is helpful.

It may be stated that the recognition and proper interpretation of the various forms of chronic arthritis will enable the physician and orthopedist to care for their patient intelligently, and to prognosticate the outcome with a fair degree of certainty.

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## REPORT OF AN UNUSUAL CASE OF RUPTURE OF THE UTERUS DURING PREGNANCY

BY J. G. HANSON, M.D.

In April, 1927, a patient entered my office to make an engagement for Caesarean section in her seventh delivery. She was 36 years old, 5 ft. 3 in. tall and weighed 280 lbs. This woman's first pregnancy had occurred in 1914. She weighed 148 lbs. at that time. The child was delivered instrumentally at home and lived six months. In 1916 she had had a difficult instrumental delivery of a second child at home. This child lived only a few days. The third and fourth pregnancies had occurred in 1917 and 1919 and in each case the child was delivered instrumentally and was still-born. At the time of the third pregnancy the patient had weighed 185 lbs. In 1922 she had a fifth baby and in 1925 a sixth, both by Caesarean section, and both living. In 1922 she had weighed about 210 lbs. and in 1925, 240 lbs.

The history of the present condition was cessation of menstruation August 11, 1926. She had previously been regular in that function, and she has observed no menstrual flow or bloody discharge since that date. She was nauseated each morning during the months of October and November. She believed she was pregnant but did not consult a physician. Foetal move-

ments were noticed at times during January. These continued throughout the pregnancy. Having had two previous deliveries by Caesarean section, she wished to make early arrangements for the one expected in May.

Physical examination disclosed a very large scarred pendulous abdomen, which contained a mass extending to about two inches above the level of the umbilicus, difficult to map out with accuracy because of the enormous amount of fat over the abdomen. The breasts were enlarged and contained fluid. Vaginal examination showed a hard fibrous cervix, the os closed. Foetal heart sounds were heard to the right and at the level of the umbilicus. Foetal movement was not felt at the time of examination.

In view of the patient's history and the results of examination, a diagnosis of pregnancy in the eighth month was made. The patient was advised to submit to a Caesarean section within the following week. It was explained to her that a live child would undoubtedly be delivered and she would escape dangers that might be present when uterine contractions of natural delivery began to occur. She pre-

ferred to wait until term, as previously, and was advised to present herself every second week for examination, but nothing further was heard from her until June 16, 1927.

The patient had been well until about two hours previous to calling me, when I found her in bed with some pain and distress in and considerable distention of the abdomen. The outline of the uterus was not defined by palpation; but a large, uneven mass could be felt. There had been no vaginal discharge and there were no regular labor pains. She was apparently in a mild degree of shock, restless, the lips somewhat blanched, the pulse 120. Her condition necessitated an immediate removal by ambulance to the hospital, a distance of about four miles. A blood count showed 2,088,000 reds, with 9,000 leucocytes, and 55% hemoglobin. A catheterized specimen of the urine was found to be normal. A diagnosis of ruptured uterus was made and an immediate exploration of the abdomen undertaken.

On opening the abdomen a large amount of old blood clot was found and considerable old blood. There was a medium quantity of what appeared to be fresh blood. A 12½-lb. female child was found free in the abdominal cavity. The uterus was ruptured for a distance of about seven inches—or its entire length above the internal os—on the anterior surface, through the line of the previous incisions. The rupture resembled a partly open book, to which had been attached the placenta, but this had been separated from about the upper half of the uterus. The cord protruded through the rent in the uterus. The lower angle of the rent in the uterus for a distance of about one inch on each side was overgrown with adherent placental tissue as far as the peritoneal covering of the uterus. The edges of the rent had the appearance of being old scar tissue and wiping with gauze showed no fresh tissue and no oozing whatever from the edges. The foetus had been dead for a very short time—perhaps two or three hours. Death of the foetus and shock to the patient had been caused by separation of the upper portion of the placenta, which induced hemorrhage.

The foetus and placenta were delivered, the edges of the rent in the uterus pared and the opening closed with chromic catgut sutures. The condition of the patient was not favorable for a hysterectomy. The abdominal incision was closed in the usual manner. The patient was immediately given salt solution and after a few stormy days, during which there was considerable distention, she began to improve and made an uninterrupted recovery.

The interesting feature, causing considerable speculation, was the time at which the rupture may have occurred. The weight and size of the

child seemed to indicate that it was much beyond term. A careful questioning of the patient and the family after the operation failed to elicit any information relative to even slight illness throughout her pregnancy. She had not been in bed for any disturbance, but on the contrary had worked every day doing the housework, washing, etc., for a family of five. It seems reasonable to suppose the uterus was intact at the time of impregnation, and it is hardly possible to expect its rupture during the first, second, or third months, for when the foetus did escape, the cord must have been developed and of sufficient length and strength to permit considerable motion of the foetus and tension on the cord. If the rent in the uterus had been completed by degrees, it might account for the absence of shock and hemorrhage in this case, which is contrary to what would be expected in a sudden and complete rupture. It would not seem that the rupture would occur later than the sixth month without shock and hemorrhage sufficient to create marked symptoms, which the patient would have felt and remembered. The outgrowth of placental tissue over the rent in the uterus, found at the time of operation, would indicate that the rupture had not been of recent origin.

In presenting this case, I raise the question now whether the diagnosis of rupture, should not have been made in April, if the accident had occurred previously, and I console myself with the belief that—with the given history and the almost impossible task of mapping out the uterus, or intra-abdominal mass through such an enormous amount of abdominal fat—others, more expert in diagnosis, might have overlooked the true condition. In such a case, in a woman with thin abdominal walls, it would undoubtedly have been easy to have found the foetus and outlined it correctly as being outside the uterine cavity.

I have searched medical literature for reports of a similar case and thus far have been unable to find one.

## MEDICAL PROGRESS

### PROGRESS IN NUTRITION

BY FRANCIS LOWELL BURNETT, M.D.

#### THE WISDOM OF THE BODY AND STRUCTURAL IMPERFECTIONS

"In our childhood most of us learnt that suffering and death came into the world through sin. Now when as physicians we stand on the other side of good and evil, we know that sin for which man is always paying the penalty is not necessarily failure to comply with some one or other of the rough tribal adjustments to the environment, which we call morality, but is al-

ways and in every case ignorance or disregard of the immutable working of nature which is being continually revealed to us by scientific investigation." (*Starling. Brit. M. J. II* 685, Oct. 20, 1923).

The immutable working of the forces of nature is continually active in all forms of life but the function of the most highly developed are very complex and delicately adjusted. This perfection is expressed in the action of the di-



gestive system which is especially designed to maintain the integrity of the body by normal nutrition. Sometime ago, however, the perfection of man was challenged and some of the organs—especially the colon—were called disharmonies of nature (Metchnikoff, *The Nature of Man*. Trans. by E. C. Mitchell, G. P. Putnam's Sons, New York 1903). But lately this challenge has been effectively answered by Keith who says in part, "the wonder is not that structural imperfections and functional disharmonies should develop in proportion to our numbers, but rather that so many of us escape harm altogether and enjoy good health. . . . The solution of our problem of life is a fuller knowledge of the use and working of those parts of our bodies most apt to give way under our modern ways of living—the use of such structures as the great bowel. And when we have replaced our ignorance by real knowledge we shall be in a position not to adapt our bodily structures to our mode of living, but our mode of living to our bodily structures."

The large bowel developed in the earliest vertebrate forms for the purpose of economy. With the evolution of land living and air breathing animals much of the potent digestive fluid was saved by the utilization of bacterial digestion. In the mucous membrane of the colon are many test tube glands of Lieberkühn, whose structure, setting, and action make them appear to supply an internal secretion, and not merely a lubricating fluid for the intestine. Since Metchnikoff wrote that the whole of the large intestine was superfluous and its removal would be attended with happy results, complete colectomy has been performed on thousands of patients; but I doubt if any will agree that the colonless individual enjoys better health than the complete person. From these facts it is necessary to conclude "that the great bowel is not a useless or superfluous organ, but one which we in our ignorance are maltreating (Keith, *A. Lancet*, II. 1047, Nov. 21, 1925).

The human colon is frequently maltreated because an understanding of the delicacy and complexity of its apparently normal action as part of a useful digestive system is not yet fully known and applied. The continual building up and maintenance of the normal tissues is brought about for the most part by the nutrient molecules absorbed from the aliment. Assimilation is the final and most essential part of nutrition; but the complexity of the nutrient molecules passed into the lacteals, transferred to the circulation, perhaps acted on by some of the hormones, and finally forming a chemical union with the protoplasm of the cells, is beyond comprehension at present. In the anabolic processes, however, the chemical reduction of the food, the absorption of the digested products, and the assimilation of the nutrient molecules, are nicely correlated; and while digestion and assimilation

cannot be accurately understood, the indices of absorption can be readily determined. In the passage of the aliment through the digestive system, it is finally moulded in the colon to form the feces. Various forms of the feces and varying period that a marked meal takes to pass through the alimentary canal have been described. (Burnett, *Am. J. Roentgen*, 10: p. 599, August, 1923), but one form and one rate are evidently normal, and these are indices of normal absorption and nutrition.

#### THE NUTRIENT MOLECULES AND TISSUE MAINTENANCE

The normal nutrient molecules added to the tissues form the most important single contribution to the development and maintenance of health. At present this condition of the body is very vague and variable, and is generally thought of as freedom from demonstrable disease; but there appears to be a broad, and unexplored zone between health and a recognized disorder. A requirement of the health correlated with the indices of normal absorption and nutrition is the continual building up of the tissues by the nutrient molecules. Under these circumstances, a reserve of health apparently accumulates which seems similar to the factors of safety in the body. On the other hand, as the indices of normal absorption have not been generally recognized or definitely established, there appear to be many factors in the food consumed and the mode of living of a person that diminish the digested products that the body recovers from the bowel. Then without the recognition and correction of these early and slight metabolic disorders, the reserve is not generally maintained. The deficiency thus created acts like an injurious agent; and with malabsorption becoming progressively worse, the factors of safety in the tissues are little by little expended, the weakest tissue is assessed and a recognized metabolic disorder becomes apparent.

A study of the nutrient molecules by cultures of tissue in different kinds of media has been made by Heaton (*Jour. Path. & Bact.* 29: 29, July 1926). In this exceedingly interesting and carefully carried out investigation bits of heart, liver, intestine and skin from chicken embryos were grown in fluid media. Young embryonic tissue grows in a pure saline fluid; but tissue older than eleven days requires nutrient molecules, or as the author calls them growth promoting hormones, of a more complex chemical composition. Then the requirements for different tissues are not the same. All tissues grow well in embryonic or adult organ extracts, but if heart muscle is put into a solution of yeast the cell growth is inhibited, whereas skin and intestine continue to grow. The substance in yeast that promotes the growth of epithelial cells has been alluded to as the antineuritic

vitamin. In the discussion of the subject only the action of the nutrient molecules on the fibroblastic or epithelial tissues have been taken into account. Another necessary consideration ought to be the variations in the capacity of the two tissues to grow. Many epithelial cells grow throughout the life of an animal, but cells of mesodermal origin generally exhibit a continuous regression after reaching maturity.

Still further evidence of the action of the nutrient molecules has been expressed by Wolbach and Howe (*Arch. Path. & Lab. Med.* 1:1, Jan. 1926) in their work on experimental scurvy in guinea pigs. With a complete food, sections of the teeth show an orderly array of the odontoblast layer closely applied to the dentin. In early scurvy this layer separates, the cells become shrunken, and irregular calcium deposits occasionally form; but the principal substance is a gelatinous material, which is supposed to be a defective product of the odontoblasts. Under these circumstances the highly specialized cells do not receive normal nutrient molecules, exhibit a perversion of function and form an abnormal intercellular substance. On the other hand, if the food is made complete, within twenty-four hours, new dentin is formed. In this case the digestive system apparently elaborates normal nutrient molecules, which when assimilated by the highly specialized odontoblasts, again makes possible a return to their normal state and the formation of true dentin.

#### INTESTINAL FUNCTIONS AND REDUCTIONS

In the process of mixing the intestinal contents and absorbing the digested products many forms of intestinal action occur. These actions are generally controlled through the control nervous system. The investigation of this nerve control by Thomas and Kuntz (*Am. J. Physiol.* 75:598, May 1926) confirmed the theory that small doses of nicotine cause a loss of the effects of vagus stimulation on the small intestine, but with large doses the response to vagus stimulation becomes greater. This change is supposed to be due to an inhibition and not a paralysis. In another study (*Am. J. Physiol.* 76:606, May, 1926), these investigators found two kinds of action in the musculature of the digestive tract; one a reflex action, which includes peristalsis and other coordinated contractions, other rhythmic contractions of the small intestine, anti-peristalsis, and other rhythmic contractions of the colon. The latter forms of motility are not inhibited by nicotine and are therefore an inherent capacity of the gastro-intestinal musculature. In studying the activities of the colon of dogs in relation to the ingestion of food Welch and Plant (*Am. J. Med. Sci.* 172:261, Aug. 1926) found the colon continuously active with irregularly recurring changes in tonus. If the colon was well filled the ingestion of a meal by

mouth increased the activity, but did not follow the ingestion of a meal through a gastric fistula. Similar results were obtained in man by introducing the recording balloon into the sigmoid colon. The observations of Hines and Mead (*Arch. Int. Med.* 38:536, Oct. 1926) on peristalsis in a loop of human intestine showed that active waves may be recorded most of the time during a hunger period, but the gut is relatively quiescent during periods of satiety. Reverse peristalsis was noted in the small intestine. Tonic spastic contractions were accompanied by violent colicky pain, and occurred twice during an attack of diarrhoea. The intestinal movements were the same during sleep as in the conscious state.

The value of thorough mastication and insalivation of the food as an essential in normal nutrition has not yet been fully appreciated. A test of the digestion of raw starch with and without mastication has been made by Strauss (*Arch. f. Verdauungskr.* 33:163, June, 1924) in some patients with fermentative dyspepsia. When the starch was introduced into the stomach with a tube undigested starch was very evident in the feces, whereas when it was masticated and swallowed the starch was completely digested. Then Pattison (*Brit. M. J.* 2:6, July 3, 1926) has found that the calcium content of the saliva is increased by a diet containing a large amount of calcium, and a high calcium containing food does not change the saliva. The observation has been applied to tuberculous children, who have a low calcium content of the saliva and this may be a factor in reducing the resistance to infection. Hawkes et al (*Am. J. Med. Sci.* 171:359, March, 1926) have continued their observations on the response of the stomach to various foods. With meat the mechanical action is prolonged, and chicken, beef, lamb and pork may be worked over for three hours. Vegetables and carbohydrate food are worked over somewhat less; and milk and vegetables the least. An intestinal intolerance in some patients for carbohydrate food has been observed by Kendall (*J. A. M. A.* 86:737, Mar. 13, 1926). These patients enjoy a state of rude health but are not fully well; they are affected with gas and large numbers of mucous bacilli are found in the semi fluid feces. The disorder is cured by a dietary regimen of low carbohydrate, considerable protein, and the liberal and frequent administration of well soured milk. In patients that have had indigestion over a long period of time, an achlorhydria is frequently found and the other digestive fluids are low in potency. To improve the digestion and absorption in such patients Sansum (*Therap. Gaz.* July 15, 1926) has elaborated an enteric coated pancreatin tablet. The tablets are coated with a substance that is only dissolved in an alkaline medium; therefore the pancreatin passes through the stomach undigested and is released in the duodenum to in-

crease the potency of the pancreatic juice. Very good results have been obtained in under-nourished patients with diabetes, tuberculosis, asthma, and some of the skin diseases.

As relatively little is yet known about the nutrient molecules that the body recovers from the bowel, Bergeim (*J. Bio. Chem.* 62:45, Nov. 1924) has devised a valuable method of determining intestinal reduction. By mixing ferric oxide in known amounts with any given food, and finding the percentage of the iron salt in the feces, the amount of the given food absorbed is readily estimated. In one study by this author (*J. Bio. Chem.* 62:49, Nov., 1924) the influence of different kinds of food on intestinal reductions was observed in rats. Most of the reduction was found to occur in the caecum and colon of these animals. Meat and eggs brought about high degrees of reduction in comparison to casein, whereas the carbohydrates with the exception of lactose and dextrin had only a slight effect. The excepted sugars produced an acid reaction in the intestine with aciduric bacteria, and this presumably caused the much lessened reduction. Fats did not produce any change, and with green vegetables and fruits low values were obtained. In a more recent study of salivary digestion in the human stomach Bergheim (*Arch. Int. Med.* 57:110, Jan., 1926) found that amylase brought about a considerable digestion of starch within thirty minutes. After the appearance of free hydrochloric acid the amylase becomes inert and cannot be activated again. The influence of carbohydrates on calcium and phosphorus absorption has also been determined by this chemist (*J. Biol. Chem.* 70:35, Sept., 1926). Starch, glucose, fructose and maltose to the amount of 25% was added to the food of rachitic rats, but calcium or phosphorus absorption was not increased; but 25% lactose brought about a pronounced increase in the absorption of both elements. This peculiar result is supposed to be due to an increased acidity of the intestine from lactic acid fermentation. In another study by Bergheim (*J. Biol. Chem.* 70:51, Sept., 1926) of the absorption of calcium and phosphorus in the small and large intestine. Animals given cod liver oil showed a positive calcium balance throughout the tract; but phosphorus secreted into the small was absorbed in the large to produce a positive balance of this element also. But in the rachitic animals calcium absorbed in the small was excreted into the large, thus causing a negative balance. With this excretion there was a failure in the complete reabsorption of phosphorus in the large intestine, and therefore a loss of this element to the body.

The reaction of the intestinal contents undoubtedly influences the anabolic processes. Foreman et al (*Tr. Sect. Gastro-enter & Proct. A. M. A.* 1925) have made an interesting study of the hydrogen ion concentration of human

feces, and found a range from pH 5 to 9. The well formed normal stool ranges from pH 7 to 7.5, but the soft and formless type is slightly acid, and ranges from pH 5 to 6.5. Patients passing feces of the latter form have symptomatic indigestion, but by the dietary adjustments of eliminating cathartics and increasing the protein a beneficial change is produced and the feces approach normal in form and reaction. Abrahamson & Miller have made a study of the hydrogen ion concentration of the small intestine of rats. With complete food the reduction of the gut was pH 5.2 to 6.5, but with a rachitic food the pH increased to 6.4 to 7.4. The addition of cod liver oil brought about normal pH values.

#### PREGNANCY, LACTATION, AND THE NOURISHMENT OF CHILDREN

In pregnancy there are many factors that influence the development of the embryo, and these undoubtedly have an effect on the future welfare of the child. An old adage that a pregnant woman should eat enough for two is gradually becoming replaced by a more intelligent point of view. Friedman (Boston M. & S. J.: 195:1015, Nov. 25, 1926) states "that if a pregnant woman eats excessively of carbohydrate food, she is apt to develop diabetes and if she eats too much protein food she is in danger of toxemia. In any case overeating develops a great deal of fat, which makes proper exercise difficult, decreases the space through which the baby must pass, produces a large body, and consequently makes labor more difficult." In the practical application of these principles, the patient at the first visit is instructed to eat moderately and is weighed at the end of a month. At this time if she has gained less than a pound a week she is encouraged to eat more; but if she has gained more, starchy foods are very much restricted. The entire gain in weight during pregnancy should be about twelve pounds. The results achieved are less alimentary discomfort, a shortening of the first stage of labor and fewer operative deliveries, a diminution in size of the baby and fewer birth injuries, and less chance of post partum hemorrhages.

The effect of inadequate food on the inorganic salt content of mothers milk has been shown in a study of a few infants by Courtney (*Am. J. Dis. Child.* 26:534, Dec. 1923). The amount of calcium, magnesium, phosphorus, chlorin, potassium, and sodium was determined in the mothers milk, and the calcium and phosphorus of the infants serum. The mother's food, in one case deficient in meat, and in another, deficient in fruit and green vegetables produced a milk that showed a very variable salt content; and in one child the blood phosphorus was low and rickets evident.

Experimentally in nursing rats the effect of a high meat diet on the growth and development of the young has been shown to be ad-

vantageous by Hitechoek (*Am. J. Physiol.* 79:281, Dec. 1926). In thirty days the total weight of two litters of the control animals was 739 grams, whereas in the same time two litters of meat fed mothers weighed 1034 grams. Furthermore the death rate in the control group was much higher than that of the litters nursed by meat fed mothers.

In the nutrition classes of a few years ago certain principles were taught that undoubtedly improved the physical fitness of many children. In a comparison of the increase in weight of these children with an uninstructed control group during a year Kaiser et al (*Am. J. Dis. Child.* 31:386, Mar. 1926) have brought out some interesting facts. Those in the classes generally made good gains at first, but at the end of six months and a year the number that held their weight was less than that of the control group. Physical defects do not bear a relation to nutrition. The classes, however do have a beneficial effect on other members of a school and also serve to correct many physical defects in children. In nutrition studies on atrophic infants Franke and Wittenberg (*Montaschr. f. Kinderh.* 32:413, 1926) found that by reducing the milk and fat and increasing the protein and carbohydrate the infant mortality has been markedly reduced at the Austrian Institute for Infant Welfare; and the welfare work in the community has decreased the number of severely malnourished infants requiring institutional care. Wang et al (*Am. J. Dis. Child.* 32:63, July, 1926) have found that racial, environmental and food habits were factors in proper feeding and brought about substantial gains in undernourished children. Somewhat the same opinion is given by Mills and Goldberg (*Med. J. Rec.* 124:210, Aug. 1926) in a study of malnutrition in infancy. As breast feeding is rare, they find most infants are artificially fed; in consequence indigestion is caused by overfeeding in quantity, in quality, and in frequency. Infection and diathesis are also taken into account. The complexity and difficulty of transforming starchy food into flesh and blood is becoming more and more apparent. Goiffon & Barron (*Rev. franc de pedi.* 2:647, Nov. 1926) from an examination of the feces of fifty presumably normal infants found large quantities of undigested starch. They are of the opinion that the final digestion of some of the carbohydrates takes place in the ascending (proximal) colon; and an excess of this food is frequently a cause of intestinal indigestion. Patterson (*Brit. Med. J.* 1:277, Feb. 13, 1926) sounds a note of caution in the use of cathartics for the treatment of constipation in children. Training and food adjustments generally suffice. The child should attempt to defecate twice daily, and fruit should be given for at least one meal a day. In a study of intestinal indigestion in children Brown et al (*Am. J. Dis. Child.* 30:603,

Nov. 1925) have frequently found aciduric bacteria which give rise to high ammonia content to the feces. The growth of young rats fed milk containing *B. bifidus* was inhibited, but by also adding the *Streptococcus lacticus* the inhibiting effect of the bacillus was nullified. In considering the bacteriology of the bowel, the organisms originate as a result of the character of the media. With adjustments in the alimentary mixture changes will occur in the flora of the gut.

The occurrence and production of ketonemia and ketonuria in childhood is being extensively studied. The formation of ketone bodies in abnormal amounts and their excretion in the urine has been commonly found as a disorder of carbohydrate metabolism in diabetes as a result of carbohydrate starvation. The incomplete combustion of fats also produces a ketosis, but this is apparently secondary, as fat burns, only in the fire of carbohydrate. Brown and Graham (*Arch. Dis. Child.* 1:302, Oct. 1926) have written a comprehensive thesis on this subject. From a study of 300 infants consecutively admitted to a Glasgow hospital 54.7% had ketonuria. A ketogenic diet of fat bacon, butter, cream and diabetic rolls produced an increase of blood acetone from two to forty times the normal amount in the children. At the same time there is a fall in the alkaline reserve, an increase in the urinary acetone, but no definite change in the blood sugar. In this condition, the administration of glucose brings about a rapid decrease of blood and urine acetone, and a rise of the alkaline reserve. On the other hand the administration of sodium bicarbonate produces an increase in the alkaline reserve, but does not always reduce the acetone. A study on the behavior of fat in the blood of children during a fast has been made by Spolverini & Vanelli (*Pediatrica-Riv.* 33:1253, Dec. 1, 1925) by counting fat droplets with dark field illumination. The children were first kept in a normal diet and fat determined; then they were fasted for sixty hours, and the fat content of the blood made a sudden drop and finally disappeared entirely. The tolerance of all children to the fast was a very good one. In observing the effects of starvation on the convulsions of epilepsy in children Karger (*Klin. Wochenschr.* 5:502 Mar. 19, 1926) found only a few children responded. A protein diet of meat, eggs and cream proved equally successful in treatment.

#### THE VITAMINS

In discussing the vitamin problem a few years ago Hopkins (*Brit. M. J.* 2:69, Oct. 20, 1923) wrote "the clear differences in function demonstrated by the differences in the effects of (vitamin) deprivation have constituted the main belief in their diversity. In studies in metabolism however, it is well to remember that chemical



events in the organism, though they be more or less isolated experimentally form an organized whole. No one process in the body can be rendered abnormal without ultimate effects on other processes." This broad point of view appears to be essential to understand nutrition. Changes in the amount, completeness, proportion, mineral elements, and times of eating apparently produce changes in the action of the digestive system; and these immediate variations of absorption and assimilation preceded by months and perhaps years the remote effects shown in the tissues of a recognized deficiency disease. Furthermore, from understanding the effects of food factors on the indices of normal absorption the incompleteness of a food may not be the only food factor that alters the structure of tissue. In an interesting article on "Diet and Disease" Mellenby (*Brit. M. J.* 1:515, March 20, 1926) alludes to this phase of malnutrition in these words. "Another condition which commonly develops in puppies when fed on diets containing an excess of cereal and a deficiency of fat soluble vitamin is diarrhoea. Diarrhoea may appear soon after the diet begins and before there is obvious bone deformity. The better the puppies are fed during the pre-experimental period the longer time will elapse before the defective diets are accompanied by diarrhoea. This statement is definitely true of rickets both as regards the prenatal and post-natal feeding of the mother and it probably applied equally to catarrhal conditions of the alimentary tract. It may also explain the variable susceptibility of young animals to catarrhal and inflammatory conditions of the respiratory tract." In applying these principles he suggests the diet of women during pregnancy and lactation should be improved, in order to increase the resistance of young infants to infection, improve the structure of the teeth, and reduce the appalling amount of caries.

An attempt to simulate experimentally the good and bad features of diets commonly ingested by peoples has been made by McCarrison (*Brit. M. J.* 2:730, Oct. 23, 1926). He fed one group of rats on whole wheat, milk products, leafy vegetables, fruit, and fresh meat, to resemble the good diet of the Sikhs; and another group was given white bread, tea, jam, margarine, boiled vegetables and preserved meat, like the bad diet of many of the Western people. In these animals the "good" diet promoted physiological efficiency, normal growth, and health; whereas the bad diet gave rise to stunting, loss of vitality, gastrointestinal disorders, and pulmonary infection. The appetite of animals fed incomplete food varies somewhat. Without vitamin B there is a marked decrease in the food ingested. In comparative experiments with rats deprived of vitamin A Simonnet (*Bull. soc. hyg. aliment.* 13:419, 1925) found that a normal amount of food is con-

sumed at first, but later there is an appreciable decrease. If the food is made complete when animals are in a deficient condition, the amount consumed at first is above normal then later it is reduced to the amount commonly ingested. The essential requirement of the accessory food factors for any animal is apparently very small and an increase in the amount of any vitamin ingested is without a beneficial effect. In observations on Vitamins and Vitality, Mitchell & Carman (*Am. J. Physiol.* 76:398, Apr., 1926) gave rats an excess of the accessory food substances and then studied the metabolism, but even ten times the requisite of vitamin B did not affect the rats.

New vitamins have not been added to those written about a year ago. They are A, B, C, D, E, and P. P. While C remains distinct, the others as far as they relate to human disorders and the cure of disease, continue somewhat confused. With vitamin A, Xerophthalmia is produced. Some of the fats, however, are anti-rachitic; and are supposed to contain vitamin D: while others form an essential food for reproduction, and are classified as containing vitamin E. Wheat germ oil is rich in this factor but will not cure rickets. Vitamin B continues to be the antineuritic factor; but yeast one of the most potent foods to contain this essential substance has also been used with success to cure pellagra, and therefore it is a source also of the vitamin P. P. As long as the essential substances of a food are determined by observing their remote effects on the tissues the confusion is likely to continue. In time however, when the immediate effect of food factors are studied from changes they produce in all phases of the metabolic processes, that is digestion and absorption as well as assimilation, then nutrition will become more readily understood. And then, it seems probable, they will be considered as only one factor—the completeness of the food—essential for normal nutrition.

The entire number of one issue of the *Practitioner* (116:117, March 1926) is devoted to special articles on nutrition. Among those writing are Goadby on the doctor and dietetics, Beverage on army rations, Howarth on food and the public health, Hopkins on the criteria of an efficient diet, Plummer on the vitamin problem, Hindhede on diet and health, and Dick on diet and dentition. Then the section of the British Medical Association on Public Health gave a series of papers on the relation between food deficiency and preventable disease. Some of these deficiencies have been summarized by Wheatley (*Brit. Med. J.* 11:185, July 31, 1926). Deficiencies of vitamin A, D, and E, in mothers-milk causes marasmus, defective growth, infection of lungs, intestines, and eyes; rickets, defective calcification of teeth, and possibly the hypertrophy of tonsils and adenoids. Deficiency of vitamin B produces loss of appetite, dysfunc-



tion of gastro-intestinal tract, colitis, lowered vital resistance, neuritis. Scurvy and interference of growth is the deficiency created by food without vitamin C. A comprehensive report on "Diet and Sterility" by Kennedy (*Phys. Rev.* 6:485, July 1926) gives an interesting and valuable account of this subject. He reflects the general opinion on this relationship by writing, "the ability to reproduce and rear healthy young constitutes perhaps the best and most delicate test of an animal's physical fitness and constitutional vigor." The causes of sterility and their remedy, not only affects the stock yard, but also has a very great influence on human affairs. In this review, the effects of insufficient, of an excess and of special components of the food on the sexual functions are discussed fully. There is also a comprehensive account of vitamin E. In an experimental study Mattill & Clayton (*J. Biol. Chem.* 68:665, June, 1926) observed the effects on rats of synthetic and milk diets in relation to reproduction. Only a small amount of butter fat provide sufficient vitamin E for continuous fertility; and wheat germ oil when mixed with lard does not lose its potency. Radiation will not compensate for a lack of vitamin E. According to the work of Nelson et al (*Am. J. Physiol.* 76:325 April, 1926) purified diets if complete did not affect reproduction in white rats; but Guest et al (*Am. J. Physiol.* 76:339, April, 1926) found reproduction in the animals possible on an amount of vitamin B barely enough for normal growth. A small amount of this essential food however, was insufficient for normal lactation and the normal development of the young animals.

#### RICKETS, OSTEOMALACIA, AND THE HEALING OF FRACTURES

The determination of rickets has become so exact that changes in the structure of the bones of the young are readily recognized with the roentgen ray. The accuracy of this means of diagnosis not only shows that this disorder is almost universal according to Wilson (*Am. J. Dis. Child.* 31:603, May, 1926) but also that cod liver oil is not a specific. In a group of forty-seven infants born in New York during the winter of 1925, one, two and three tablespoons of biologically tested cod liver oil were given; but sixty per cent. showed clinical and ninety-one per cent. roentgenographical evidence of abnormal epiphyses; whereas a somewhat smaller control group without cod liver oil only showed clinical evidence of the disorder in seventy-six per cent., and ninety-eight per cent. showed evidence in plates. The infants born in the summer and treated with cod liver oil showed the same abnormal bony changes as the untreated infants; ninety-seven per cent. of both groups had rickets. Furthermore, most of the infants under five months had blood calcium and phosphorus values within the presum-

ably normal limits. It is therefore evident that the degree of bone changes must be marked to alter the proportion of these salts in the blood. A note of warning has been sent out by Agduhr (*Acta Ped.* 5:319, Mar. 1926) in regard to the universal use of cod liver oil in infant feeding. From experiments with various complete diets with the addition of cod liver oil in mice, atrophy, degeneration, and necrosis of the heart muscle were often apparent, but the heart muscle of animals consuming similar diets without cod liver oil was unaffected. The investigator supposes that this oil contains a toxin, which is somewhat inhibited by the addition of a salt mixture.

A study of the mineral metabolism in rickets has been made by Telfer (*Quart. J. Med.* 20:1, Oct. 1926). He finds that calcium, magnesium, and phosphorus are not well retained by the body during the active stage of the disease. The evidence is deduced from the excess of these mineral substances excreted in the feces, the total fat within normal limits compared to low combined fatty acids, and the percentage of urinary phosphorus is considerably less than the amount of this salt in the feces. In discussing these observations the disorder points to defective absorption as a result changes in the gastro-intestinal functions. The relation of calcium and phosphorus in the diet to the absorption of these elements has been observed by Orr et al (*Am. J. Dis. Child.* 28:574, Nov. 1924). An excess of calcium ingested, tends to increase the absorption and retention of this element, but impairs the retention of phosphorus; whereas with an excess of phosphorus in the food, an insoluble calcium phosphate is formed in the intestine and an abnormal amount of calcium is lost in the feces. The irradiation of mothers, infants, young animals, and foods to increase the absorption of calcium and phosphorus continues. Light however cannot be substituted for vitamin A indefinitely, according to Hume (*Brit. Med. J.* 11:341, Aug. 22, 1925), for the growth and well being of rats. The action the quartz lamp on some foods gives them peculiar anti-rachitic proportions. Cholesterol was one of the first substances to prove this effect; but now orange juice from the work of Maslow et al (*Bull. Johns Hopkins Hosp.* 39:56, July, 1926) will bring about healing in rickets; and curiously enough irradiated sawdust from the observations of Hume & Smith (*Biol. Chem. J.* 20:335, 1926) has a similar effect.

In studying osteomalacia in Kashmir, Vaughan (*Brit. Med. J.* 1:416, Mar. 6, 1926) found that the boat women who work hard in the open and eat raw food with fresh vegetables in their rice, are quite free of this disease; but the wealthy women, who are secluded and idle develop it frequently. The mineral elements forming teeth varies considerably. Normal teeth

contain a large percentage of calcium and like granite resist injurious agents; whereas unhealthy teeth have some of the calcium replaced by magnesium, and like sandstone are subject to erosion and decay. An interesting observation by Howe (*Dental Cosmos*, Nov. 1926) described the use of spectrum analysis to determine some of the mineral elements in teeth. Ununited fractures are occasionally troublesome to surgeons; but in treatment little thought has ever been given to nutrition. In the histological study of experimental scurvy by Wolbach & Howe (*Arch. Path. & Lab. Med.* 1: Jan. 1926) the effect of bone healing was observed. In completely fed guinea pigs an incision of the shaft of the femur at the end of six days was surrounded by a good sized external and internal callus and was nearly filled with a new bone matrix which incorporated a single row of osteoblasts on each side of the gap. On the other hand in animals fed a scorbutic diet, no new bone was apparent in nine days, and the gap was filled with fibroblast like cells, without capillaries, or a trace of collagen. Cells having the appearance of osteoblasts were absent, and there was no bone matrix formation. A somewhat similar study has been reported by Israel & Frankel (*Klin. Wochenschr.* 5: 94, Jan. 15, 1926) in which callus formation was observed in normal and scorbutic guinea pigs. A fracture of the femur in a properly nourished animal shows a periosteal callus in two, and complete consolidation in five or six weeks; but the scorbutic animal shows no sign of repair in three or four weeks. Normal repair will begin at anytime if the food is made complete. In a group of animals with fractured femurs, a complete food was given for two weeks, and then vitamin C was omitted, but the repair process went on normally for four weeks. Then the animals were kept in a chronic state of scurvy; and the newly formed callus became gradually atrophied and decalcified until it consisted of an easily broken shell.

#### BERIBERI, SCURVY, AND PELLAGRA

is preëminently a nutritional disorder and due is preëminently a nutritional disorder and due to a dietary deficiency, yet Couto of Brazil (*Arch. f. Schiffew. Tropen: Hyg.* 30: 275, July 1, 1926) regards it as an infectious disease. To support the opinion, he writes that beriberi is very prevalent in his country near the equator but almost unknown in the southern portions; and the rice consumed in all parts of the country is prepared the same. Here too, it appears to spread in an epidemic form, shows a tendency to dropsy, digestive disturbances at the outset, and cardiac and visceral symptoms. In experimental beriberi Farnum (*Ar. Int. Med.* 37: 212, Feb. 1926) found in dogs that the volume and total acidity of the gastric juice was gradually decreased, but be-

came normal again with complete food. In a similar way Cowgill et al (*Am. J. Phys.* 77: 389, July, 1926) made a study of the gastric motility of dogs exhibiting severe symptoms of vitamin B deficiency. Early in the disorder the rhythmic tonus is frequently absent and the contractions of a series are not numerous; but later when the loss of appetite is associated with changes in the muscles and nerves, gastric atony prevailed. Normal gastric motility was restored again with complete food. In fowls with beriberi the blood shows an increased acidity according to the experiments of Akiba (*Keio. Ig. Tokyo* 2: 142, 1922). In experimental scurvy Wolbach & Howe (*Arch. Path. & Lab. Med.* 1: 1, Jan. 1926) have made an interesting and illuminating study of this deficiency disease, which has been already partially described. They characterize the disease as an inability of the supporting tissues to produce and maintain intercellular substances. This conclusion has been made through observations on the dentin of the teeth, the growth and repair of bone, and the repair of soft tissues. The repair of bone in scurvy is by an avascular fibrous like organization with no bone. In the soft tissues a fibrinoid substance is deposited as reparative material. The absence of capillary formation in the organizing tissue is due to a failure of the endothelial cells to form an essential intercellular substance. This observation confirms the inference of Aschoff and Koch (Scurbut, Eine Pathologische Anatomische Studie, Gustav Fischer, Jena, 1919). The blood phosphorus of scurvy has been found low in guinea pigs according to the observations of Edelstein & Schmal (*Ztschr. f. Kunderh.* 41: 30, 1926) but calcium and dextrose were found within normal limits. In studying the relation between tuberculosis and scurvy in guinea pigs Heymann (*Klin. Wochenschr.* 5: 59, Jan. 8, 1926) found that scurvy is accelerated by the infectious disease, but the dietary deficiency did not have an effect on tuberculosis. A general but comprehensive article on pellagra has been written by Goldberger (*Medicine* 5: 79, May, 1926), in which he states that this disease is caused by a faulty diet. The probable specific etiological agent is a deficiency of the P. P. factor, which has heretofore been included with vitamin B. This is no doubt due to the potency of yeast as a preventive food. In another study by Goldberger and his associates (*Pub. Health. Rep.* 41: 297, Feb. 19, 1926) they found that fifteen grams of yeast daily was enough to prevent pellagra but was deficient in vitamin B. A daily allowance of 200 grams of lean beef however, was quite as efficient as a preventive agent, but the addition of butter to a pellagra producing diet is without value. While faulty food and one especially low in protein are generally considered the cause of pellagra Sutton (*Am. J. Med. Sci.* 172: 374, Sept. 1926) makes

an ineffectual attempt from a study of a few patients to revive the infectious theory. The argument is weakened somewhat by the treatment advised; for the "patients are given a list of high protein foods and told to model their diet on it."

In the opening sentence of Cannon's book on the Mechanical Factors in Digestion, he writes "since the digestive tube is an enfolded portion of the body, food taken into it is not in the body, but is merely enclosed." The pertinency of this reflection is illustrated by a patient reported by Barnes (*An. Clin. Med.* 4:552, Jan. 1926). This patient had an ulcerative colitis, and although she was given a complete high calorie diet, a typical case of pellagra developed which was not amenable to treatment. This sequence of events illustrates again, that normal nutrition is not dependent on the amount of nutritive material passing through the body, but the food products that are digested and absorbed. The potency of the digestive fluids in deficiency diseases may be of diagnostic significance according to Guthrie (*Am. J. Trop. Med.* 6:357, Sept. 1926), who believes that a normal hydrochloric acid content is an important diagnostic sign against pellagra. This acid should be generally given to patients in treatment.

#### ANEMIA, DIABETES, NEPHRITIS, AND CANCER

The practical application of the experimental work of Whipple and his associates on the relation of food to blood regeneration has been made in pernicious anemia. Gibson & Howard (*Arch. Int. Med.* 32:1, July, 1923) studied minutely the effects of a diet made up of about 70 grs. of protein, 40 grs. of fat, and 300 grs. of carbohydrate on eleven patients with this heretofore progressive disorder, and obtained gratifying results. In the study however, they came to the conclusion that the additional treatment of iron and arsenic was advisable. More recently Minot & Murphy (*J. A. M. A.* 87:470, Aug. 14, 1926) have pointed out the value of a high protein and fruit but low fat diet in the treatment of pernicious anemia. The daily ration consists of at least 120 grs of cooked beef or calves' liver, with the same amount of beef or mutton, 300 or more grams of leafy vegetables, 250 or more grams of peaches, apricots, strawberries, pineapple, oranges and grapefruit; but only a small amount of fat is given. The diet consists of about 135 grs of protein, 70 of fat and 340 grs of carbohydrate. One of the earliest effects of the diet influences the dejections, as patients with diarrhoea begin to have formed feces, and those dejecting irregularly had a well formed daily dejection. Of the forty-five patients under observation, the average corpuscle count before treatment was 1,470,000 cells, but after a month's treatment the average had risen to 3,400,000, and for most of the patients observed for more than four months, the average

had increased to 4,500,000. Considering this diet from its nutritional aspect, the amounts of protein, liver, vegetables, and fruits appears to be excessive, if consumed regularly for any length of time. Somewhat less of these foods should serve the same purpose and probably not lead to some other metabolic disorder later.

The cure of diabetes is nutritional, and insulin serves as an aid to the anabolic processes. In omnivorous animals like man, carbohydrate is an essential food; and a diet without a sufficient amount of this food appears to be a factor in producing carbohydrate starvation which sometimes results in ketosis or an injurious carbohydrate debauch. In an interesting article by Sansum et al (*J. A. M. A.* 86:178, Jan. 16, 1926) about 100 grams of protein, 100 grams of fat, and 200 grams of carbohydrate are advised as a normal standard diet and correspondingly large amounts of insulin are given to improve the carbohydrate metabolism. In this plan of treatment the patients' blood sugar is readily kept normal, they are restored to a better physical and mental state; they do not have acidosis, and they lose their craving for starchy food. A patient with avitaminosis in the course of diabetes has been reported by Wohl (*J. A. M. A.* 87:901, Sept. 18, 1926). The deficiency disorders were manifested by a paralysis that resembled beriberi, and an inflammation of the eyes like xerophthalmia.

The consumption of protein by man has been suspected of being a factor in causing nephritis; and while experiments have been carried on with animals the results so far obtained do not bring the question any nearer solution. The observations by Peters and Bulger (*Arch. Int. Med.* 37:153, Feb. 1926) cast a new light on this problem. They argue that patients with a nephritis generally show evidence of previous protein deficiency, which may be caused by faulty food and the nitrogenous wastage of the disease. This deficiency may be made up by the consumption of protein to cover the nitrogenous requirements and the loss of albumin in the urine. From the observations of Newburg & Marsh (*J. A. M. A.* 85:1703, Nov. 28, 1925) nephritis is always produced in rats consuming a diet of 39% protein in ten months. The work of Osborne & Mendel (*J. Biol. Chem.* 59:13, Feb. 1924) is not in accord with these results. They gave rats a diet of at least 50% protein and while the kidneys were enlarged, inflammatory or degenerative changes were not found. Similar results were obtained by Jackson and Riggs (*J. Biol. Chem.* 67:101, Jan. 1926) in which rats consumed a diet of 20% casein and 56% egg albumin for 10-20 months. On the other hand Anderson (*Arch. Int. Med.* 37:313, Mar. 1926) found a high protein diet in rabbits produces a renal hypertrophy and atherosclerosis of the aorta; and when 2/3 of the kidney substance is removed the hypertrophy

is augmented and urea and creatinin are retained.

A few years ago Osborn and Mendell reported that kidney stones were sometimes found in their deficiently fed animals. Particular attention has recently been given to the subject by Fujimaki (*Japan Med. World* 6:29, 1926) who found that concretions were formed in rats on a diet deficient in protein and vitamin A in the shortest time. The urinary calculi were composed of carbonates and phosphates, while the bile stones were made up of calcium salts, cholesterol, and pigment.

The determination of malignant tumors is not always clear cut and definite. Progressive and metastasising growths do occur in animals and cause death, but reports have been made from time to time of abnormal epithelial growths in deficiently fed animals. As pointed out in an editorial these growths may be precancerous and are suspicious, but more than that cannot be said. As a cancer preventive Charles (*J. Cancer* 3:1, Jan. 1926) advises hygienic living, with proper food, outdoor exercise and the avoidance of constipation. The sensitiveness to mouse cancer is influenced according to Eber & Klinge (*Ztschr f. Krebsforsch.* 22:359, June, 1925) by a diet rich in cholesterol and Scharlach red.

#### THE QUEST OF HEALTH

The knowledge acquired of communicable diseases and the measures adopted to prevent them in recent years has been an outstanding triumph of scientific medicine. While these achievements of public health have greatly reduced the morbidity and mortality of some of the infectious and other diseases, the role of private health or personal hygiene has made but little real progress. In a brief survey of health problems, Sir George Newman has written "An Outline of the Practice of Preventive Medicine." (His Majesty's Stationery Office, London, 1926.) In this interesting pamphlet some of the topics written on are, the dominance of the body; the time lost from employment through illness; the application of new principles in medicine; infant welfare; the prevention and treatment of rheumatism, rickets, indigestion and alimentary disease; and the practice of hygiene. Some of the telling phrases are these. "Man's survival in Nature is evidence of the predominance of the body and the mind in the struggle, and the cardinal fact is after all the foundation of Preventive Medicine." "Many . . . collateral issues must be considered . . . , but first and last stand the nurture . . . , the strengthening and husbanding, of the natural resources of the individual." (p. 20-21.) "The time . . . has come . . . for taking an ordered attack on that mass of crippling morbidity . . . which is undermining the ca-

capacity and efficiency of the people." (p. 51.) "The problem of infant mortality will be solved only in so far as the whole function of motherhood is fulfilled under favorable conditions." (p. 66.) "More than half of the chronic complaints which embitter the middle and latter part of life are due to avoidable errors on diet." (p. 112.) "The office of Preventive Medicine in regard to diseases of the digestive system is . . . to educate (the people) in the hygiene of dietetics . . . to prevent deficiency diseases, dyspepsia, alcoholism, intestinal stasis, and infectious processes in the alimentary canal, and to build up a well nourished and resistant body." (p. 113.) "Even more searching investigations are necessary in other directions, of which the following may be named as illustrations: (b) Nutrition. The foundations of nutrition; dieting in relation to dyspepsia; the food of the industrial worker; deleterious foods; the relation of food to age, sex and climate; the relation of food to assimilation and deficiency diseases (rickets, scurvy, etc.); the relation of food to chronic diseases such as cancer." (p. 129.)

#### THE PROGRAM AND RESTORATION OF HEALTH

If the digestive system is a very delicately adjusted mechanism, which is influenced in its action by many internal and external factors, what use should be made of it? The nutrient molecules the body derives from the digestive system seem similar to the hormones; they cannot be analyzed or understood at present, and their complement or partial absence in the body appear to be quite without symptoms over a long period of time, or while a tissue or organ is compensated. While these nutrient molecules are vague and difficult to understand, a clue to their completeness may be had by an understanding of the indices of absorption, as the three phases of the anabolic processes, digestion, absorption, and assimilation are nicely correlated. Under these circumstances how should these principles of nutrition be applied? With few exceptions all persons have a nutritive apparatus that is capable of normal action if it is properly used; therefore they must be educated to understand the factors that promote the normal action of this delicately adjusted mechanism and the physical well-being of the body. For if many diseases of the human body are due to metabolic disturbances, they are cured only by improving and maintaining the anabolic processes; and this simply means normal nutrition in the control of health.

To improve and maintain the anabolic processes requires a knowledge of the factors that influence normal nutrition as shown by the action of the digestive system; and their application in adjustments in the mode of living. What factors can be adjusted in the mode of



living to improve the physical fitness of the body? Will eating too fast and too much affect the action of a delicately adjusted digestive mechanism, and promote health? Does the habitual consumption of too much rich, highly spiced food, or sweets add to one's well-being? When too little food is consumed and cathartics are constantly required will this lead to building up the tissues? Is a sedentary existence conducive to developing the muscles, the full use of the lungs, or maintaining the factors of safety in the heart? Will working or playing into the small hours of the night, and imperfect rest aid in the restoration of a depleted nervous system? These questions are only a few that everyone must answer if health is to be maintained.

The practical application of these principles of nutrition in the restoration and control of health has already been made in the treatment of eczema and psoriasis (Burnett, *Am. J. Med. Sci.* 164: 415, Sept. 1923). In all of these patients some fault or faults were found in the mode of living that required correction to improve nutrition. As these disorders are evidently metabolic and due to a failure of the nutrient molecules to keep the ever growing skin built up and healthy, they are cured by adjustments in the mode of living so that the aliment generally passes through the digestive system within the limits of normal absorption. In many of these patients the restoration of a healthy skin is not difficult. The real problem is to keep them from returning to their former erroneous ways, and afflicting themselves with intestinal indigestion and malabsorption; for if malabsorption continues for any length of time, there will be a failure of the nutrient molecules to reach the skin, and new lesions will appear.

In attempting to keep the indices of nutrition generally normal, it is necessary to keep a check on the action of the digestive system. If the feces indicate intestinal indigestion, care should be exercised in the way of eating and the food consumed, until they become normal. As a second check, an evening meal should be marked once a month, and the intestinal rate estimated. If this determination is below or above the normal limits, faulty food factors, insufficient rest, or too little exercise are responsible, and should be corrected, before a more serious disorder is apparent. A third check should be made on the weight of the body. A deviation of a few pounds above or below a condition of physical fitness is again a sign that the body is not getting the essential nutrient molecules from the bowel. Consequently it behooves every man, woman and child, to make out a health program and put it through, for it is becoming more apparent that in this way only will some of the disorders of the body be prevented or cured. Several times a year a report should be made to a counsellor of health, and further advice sought. At one of

these visits a thorough and comprehensive health examination should be made to find out the value of the health program.

Patients with psoriasis are sometimes subject to iritis or arthritis; and these diseases also appear to be metabolic in origin. At the present time these principles of nutrition are also being applied in the treatment of these recurrent types of eye and joint diseases. From these investigations evidence is accumulating to show that weak eyes and joints may also suffer from a failure of the nutrient molecules to reach these tissues. The malassimilation is due to ignorance or disregard by the patient of the essentials of right living. The restoration of health is brought about by educating the patient to eliminate faulty food or other factors, so that the body generally receives its complement of nutrient molecules. Under these circumstances, a health program must be made out and followed so that the indices of absorption are generally normal, and the delicately adjusted and relatively unknown condition of the body-health is maintained.

#### HEALTH EXAMINATIONS

A concise and practical "Manual of Suggestions for the Conduct of Periodical Examinations of Apparently Healthy Persons," (*American Medical Association*, Chicago, 1925) furnishes an excellent outline for the counsellor of health. It says in part "We doctors have been content to be intelligent mechanics, limiting our attentions to that most intricate of all machines, the human body. Few of us have mastered the art of instructing drivers or have become consciously expert in the management of our own machines. . . . We are not wholly to blame for this attitude. . . . So many defective machines are constantly parked in our offices that we have no time to think of the drivers except for necessary brief directions. . . . Eventually certain parts of the training in health habits may become a definite part of general education; but at the present time, when further research and analysis of experience are needed, the training and methods of doctors fit them to be leaders in this field. . . . One naturally believes that prevention of illness should begin with children. . . . While results with adults will not at first be startling, any one who has had his defects pointed out, and who has been directed in methods of mending his ways, is bound to be an active force in influencing young folks to learn to manage their lives intelligently."

In obtaining a history of a person who seeks health advice, "it is important to know how he feels, how he sleeps, what he eats, how effectively he does his work and the nature of it, his home environment, his modes of exercise and recreation, how he gets on with his family and associates, and whether he has any worries." In the form printed the following questions are



asked in regard to use or abuse of the digestive system. "How often do you eat? regularly? where? between meals? time of meals? Are you a moderate or hearty eater, taking one or more helpings at a meal of meat? baked beans? green vegetables, starchy vegetables? pie? cake, pastry? sweets? fruits? salads? bread and butter? How much do you drink of milk? water? tea? coffee? soft drinks? alcoholic drinks? How much candy do you eat? How much tobacco do you smoke? Do you have a movement of the bowels daily? Without laxatives? Following the history is the form for the physical examination, with which height and weight tables for men and women are appended.

In the last part of the manual is a section on hygienic advice. Some of the topics relating to nutrition are: overweight and underweight; general principles in prescribing diet; poverty not the cause of underweight; habits of eating and drinking; the cathartic and enema habit.

#### TREATMENT FOR CASES OF INFANTILE PARALYSIS

Evidence continues to accumulate that the improvement in muscle development in poliomyelitis cases, after all acute symptoms have subsided, goes forward much more rapidly if the muscle exercises prescribed by an orthopedic surgeon are given in a pool instead of on a bed or other flat surface as has previously been the usual procedure.

Opinion seem to differ as to whether this result is due entirely to the buoyant effect of the water, or whether the resistance of the water, its relaxing effect and the fact that a patient can take a much longer exercise period with less tiring are not all contributing factors.

Pool facilities and treatment for poliomyelitis convalescents are being offered in a number of different parts of the country, one at least being in New York State. One of the more recent ones is located at Warm Springs, Ga., the surgeon-in-chief being Dr. LeRoy W. Hubbard, formerly orthopedic surgeon in the New York State Department of Health. His director of nurses is Miss Helena T. Mahoney, formerly one of the Department's supervising nurses assigned to poliomyelitis aftercare.

The pool at Warm Springs has the special advantage that the temperature of the water is maintained at a constant level of 88 degrees by the flow from the spring. Facilities for heliotherapy have recently been added.

This foundation was incorporated by Mr. Franklin D. Roosevelt, himself a sufferer from infantile paralysis.—*United States Daily*.

#### MASSACHUSETTS REPORTS ON SPECIAL CLASSES

The State of Massachusetts reports a multiplication of special classes for mentally retarded children in its public schools during the last six years. Whereas in 1921 there were only 24 towns in the State providing special classes in their schools, this year 118 towns have such classes which care for approximately 6,000 mentally handicapped children a year.

These facts were brought out in a report issued by the Division for Mental Deficiency of the Massachusetts Department of Mental Diseases which credits this rapid development of special facilities for the

training of mentally defective or retarded children to the operation of the State-wide system of school clinics inaugurated in 1921.

The report recounts the results of a survey of 4,040 retarded children made by Dr. Neil A. Dayton of Boston, Director of the Division, and his staff, in pursuance of a Massachusetts law requiring the examination of all public school pupils who are retarded three or four years in their school work. Fourteen traveling clinics were engaged in the study which was one of the most comprehensive of its kind ever undertaken in any State.

Of this total number of children examined 75 per cent. were found to be deficient, 8 per cent. had one or both parents mentally deficient, and 3 per cent. had one or both parents mentally diseased. Eighty-four per cent. failed to pass the first grade in school. Dr. Dayton makes the following statements:

"It is commonly believed that the feeble-minded are more apt to be the last children born in a family, when the parents are older and less vigorous, but this study shows that the feeble-minded tend to be the first or second rather than the last child. The theory of older people having feeble-minded children receives another setback when we examine the age of the parents. In our series the largest number of parents fall in the age group of 25 to 29 years.

"It is also said that the feeble-minded are most apt to occur in large families and that one is apt to find whole families of feeble-minded. In 47 per cent. of our 4,040 cases, the patient was the only one of the family to be feeble-minded.

"Our investigation also disproved the legend that the mentally deficient are puny, underweight and undersize. We found no great variations from the national averages. In fact, the trend was for the deficient to be a little taller."—*Mental Hygiene Bulletin*.

#### RESEARCH INTO HOUSEHOLD REFRIGERATION TO DETERMINE ITS RELATION TO HEALTH

Household refrigeration and its relation to health is the subject of economic and scientific investigation now being carried on by the Bureau of Home Economics, Department of Agriculture.

The study is a cooperative project, financed by local representatives of the two agencies in this country most interested in home refrigeration: The Society for Electrical Development and the National Association of Ice Industries. . . .

"Last but not least is the relation of household refrigeration to health. The importance of careful handling of food is recognized as never before. Low temperature is an important element in this case.

"Slight traces of spoilage not perceptible to taste may cause much difficulty. The bacteriological study will show the influence of temperature on the growth of disease produced by microorganisms."—*United States Daily*.

#### NEW YORK STATE CARES FOR 2,000 CRIPPLES

According to the report of the State orthopedic surgeon there were 2,007 patients, crippled by poliomyelitis (infant paralysis), under State care on September 1 as compared with 1,550 on May 1, an increase of 157 cases in four months. The number of cases with onset since 1916 was 1,671, representing an increase of 180 cases, while the number of cases under care with onset prior to 1916 decreased by 23.

Ten clinics were held during August with a total attendance of 143 patients of which 53 were children of pre-school age. Over one-half (79) of the number who attended were poliomyelitis cases, while 64 came because of other orthopedic defects.—*United States Daily*.

**Case Records**  
of the  
**Massachusetts General Hospital**

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN  
WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.  
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 13501

AN OBSCURE GENERAL INFECTION

MEDICAL DEPARTMENT

A married Italian-American saleswoman twenty-six years old came to the Emergency Ward October 11 complaining of aching and weakness in the muscles of the legs and arms.

Four days before admission she woke in the early morning from a nightmare and found she had severe frontal headache, marked fever and thirst. On walking she found that her legs were very weak and that there was a dull aching of the muscles, like a "tightness". She was not faint, but walking was rather distressing. She went back to bed and to sleep. On waking at the usual time she found that the headache was gone but that the fever still persisted and the muscle aching was worse. There were no other symptoms. She stayed at home from work in about the same condition all day. The muscle aching did not extend beyond the legs and upper arms, with some questionable lumbar aching at times. The following day she felt somewhat better. The fever seemed to be gone. The muscle aching remained. Walking was still distressing. A red lump appeared on her right thumb and another at the same time on her left wrist. These became pustules, which she opened. The day before admission the muscle aching was better. She returned to work. At the end of the day she was very tired and went home feeling much worse, with headache and severe aching of the legs. The pustules she had opened were painful and infected. She used iodine liberally. Her forearm muscles were tender to touch. She had a restless night with bad dreams. The morning of admission she had severe headache and she thought some fever. As soon as she got up she had a real chill lasting almost half an hour. No perspiring followed, but instead she continued to be chilly all the morning when she went to work. In the latter part of the morning she had another shaking chill. She had noticed no cough or sputum, but by evening her nose and throat seemed stuffed up and during the history taking she coughed.

The family history is irrelevant. She had been married three years, but left her husband six weeks after marriage.

At seven years she had jaundice. July 21,

three months before admission, she was treated in the Out-Patient Department for a profuse vaginal discharge of two months' duration. Examination was negative except for inflammation of the cervix and some erosion. A smear showed many pus cells. July 30 the cervix was slightly red. There was no discharge. A diagnosis of chronic endocervicitis was made. Three years before admission she weighed 125 pounds, her best weight. Her weight had gradually fallen to 105 at present.

Clinical examination showed a well nourished young woman with flushed, hot skin and injected conjunctivae and throat. There were two vesicular spots on the uvula. The heart, lungs, abdomen, genitals and rectal examination were negative. Vaginal examination showed thick purulent discharge. On the right thumb was a pea-sized hemorrhagic pustule which had been punctured, and on the left wrist another, each surrounded by an area of erythema the size of a quarter dollar. There was tenderness in the antecubital space of the left elbow, slight tenderness on the flexor surface of the right forearm and marked tenderness to pressure on both calves.

Urine normal in amount, specific gravity 1.008 to 1.030, cloudy at 12 of 15 examinations, alkaline at six, a very slight trace of albumin at one, sugar at one. Sediment of a catheter specimen showed 15 to 20 leucocytes per field in clumps. A culture from this specimen showed diphtheroids, staphylococcus albus, non-pathogenic Gram-negative bacilli resembling paratyphoid. All other specimens of sediment showed 3 to 300 leucocytes per field. Renal function 50 per cent. Blood: 14,000 to 24,600 leucocytes, polynuclears 82 per cent., hemoglobin 70 to 80 per cent., reds 3,590,000 to 4,000,000. Moderate achromia and anisocytosis. Platelets normal. Wassermann negative. One cervical smear showed 50 to 150 leucocytes per oil immersion field, no Gram-negative diplococci. Another showed no Gram-negative diplococci. A culture from the cervix showed no growth. Culture from vesicles on the left palm, three tubes, no growth.

Temperature 98° to 103.3° until October 18, afterwards not above 100°, after October 22 not above 99.8°. Pulse 80 to 112. Respirations normal.

The morning after admission the temperature was normal and the patient felt much better. The general condition and the wrist lesions improved until the 14th. That night she complained of pain and stiffness in the left elbow. The elbow was red, slightly swollen, tender and painful on motion. The temperature was 103.4°. She was put on twenty grains of sodium salicylate three times a day, to be discontinued in case of ringing in the ears or nausea. By advice of a urologist she was given ten grains of urotropin and ten grains of acid

sodium phosphate three times a day. October 17 there was an acute flare-up of the left wrist with a small red pimple similar to those on the thumb and wrist before admission. That night the right foot was hot, swollen and very tender. October 21 she was symptom-free except for the right wrist. The leucocyte count continued to range from 19,000 to 24,600 until October 31, when it was 14,000. By October 29 the temperature was 99.4°, the pulse 94. There were no joint symptoms. There still was pyuria. November first she was discharged.

#### DISCUSSION

BY RICHARD C. CABOT, M.D.

#### NOTES ON THE RECORD

This is the history of an infectious disease. There are a great many different infectious diseases to which all that is said here, except the account of the pustules, would be perfectly natural. Typhoid, meningitis, pneumonia, tonsillitis, any type of septicemia and a great many other infections might begin in that way. The only thing we have to give any point to our guesses is these pustules, which make us think of streptococcus or staphylococcus sepsis.

The past history does not help us at all. I see no reason to believe that the local pelvic disease has any relation to her present trouble.

#### NOTES ON THE PHYSICAL EXAMINATION

It looks to me as if the infection, whatever it was, included the kidney, and that she was excreting bacteria probably as well as leucocytes as a result.

This is the blood of a slight secondary anemia with leucocytosis, as one would expect with an acute infection.

There is no evidence of gonococcus infection, which has never been shown in any of the smears.

The temperature surprises me by being so low,—on the whole most of the time about 99°, and the pulse between 90 and 100. The temperature went down toward the end, and was never high.

#### DIFFERENTIAL DIAGNOSIS

I think we have certainly to say that this is a case of general septicemia showing itself in a great many parts of the body, the only discussable point being the causative organism. I suppose we had a positive blood culture which Dr. Mallory will reveal. Certainly we have no reason to doubt that this is a general septicemia. It shows itself in a great many different places,—the muscles, subcutaneously, singularly little in the joints—I do not remember a mention of joint soreness,—the kidney, some cough,—all of which sounds more like staphylococcus than it does like streptococcus. Streptococcus almost

always hits the joints if it is generalized at all. It is much more likely to hit the heart, of which we have no evidence; does not hit the kidneys, which were obviously affected here, whereas staphylococcus does. Yet all of these items make a rather insecure basis of causal diagnosis.

Are there any other organisms which we should consider? Pneumococcus? No. Typhoid? No. Syphilis? No. Gonococcus? No. Meningococcus? No. I do not see anything except the pus-producing or pyogenic coccus, and I have given the reasons for preferring a staphylococcus to a streptococcus,—because of the regions of distribution.

We shall have no post-mortem, but I do not see any evidence that the heart is affected. The interesting thing about the case is the recovery. Some people think that the salicylates have some action upon bacteria in the blood or upon infection itself. They were given here and the patient got well, but that does not convince me that it was cause and effect. I think she got well because she got up enough immunity by rest in bed and good nursing to fight the infection.

DR. GEORGE M. LAWSON: Dr. Cabot was right in saying that the patient evidently had a septicemia, and also in saying that it was a septicemia due to a pus-producing coccus, but he did not go quite far enough and include the Gram-negative cocci in this category. The organism isolated from the blood on the 18th of the month, at the time of the sudden rise in temperature, proved to be a Gram-negative diplococcus. It grew very sparsely on blood agar, better on ascitic agar, and not at all on plain agar.

There was some doubt whether the organism present was meningococcus or gonococcus. Of course it was more likely that we were dealing with a meningococcus rather than a gonococcus septicemia; the former being relatively more common. These organisms, however, did not agglutinate with four antimeningococcus sera which we employed, and the sugar fermentations made us feel certain that we were dealing with a gonococcus.

I believe the history is a bit at fault in not mentioning the fact that smears from the urethra in this case did show Gram-negative intracellular diplococci. I think we were perfectly justified in this case in saying that the patient had a septicemia due to the gonococcus.

DR. CABOT: Aren't the localizations very unusual for the gonococcus?

DR. LAWSON: No, I do not think they are. Of course the gonococcus usually localizes in the joints and sometimes on the valves of the heart. The cutaneous manifestations are by no means uncommon. When they occur they may take the form that this patient showed, or may be much larger bullae. They may be vesicular, or very small red lesions resembling rose spots.

DR. CABOT: I think it would be desirable, before this case is published, if you could add some references about that. I think very few of us know about the cutaneous manifestations. It is very interesting. I am very glad to know about it.

DR. W. S. BURRAGE: I should like to say that I have a letter here from this patient written three days ago. She writes, "This is to let you know I am feeling fine and have no fever as yet."

## NOTE BY DR. LAWSON

This case illustrates the value of taking blood cultures shortly after a chill. The organisms were present in the culture taken on the eighteenth, but could not be recovered from a second culture six days later when the patient was afebrile. It must be fairly common for a patient with acute gonorrhea to have a fleeting shower of gonococci in the blood, but unless blood cultures are taken at the crucial moment the condition may escape recognition, especially in a case such as this, where lasting complications such as arthritis or endocarditis did not supervene.

It is not surprising that we were unable to culture the gonococcus from the skin lesions. Even in more common forms of metastatic skin involvement this is quite difficult.

The embolic skin manifestations are generally located on the trunk and extremities. The most common type of lesion resembles urticaria, but no itching accompanies it. A nodular lesion resembling erythema nodosum may be present and persist for a considerable length of time, as in this patient. When the organisms in the blood stream are numerous, a widely distributed skin rash may be seen. The lesions here are much smaller than in the preceding types and may resemble the rash of German measles or the rose spots of typhoid. Dr. Blumer's article in the Oxford System gives a quite exhaustive report of the complications of gonococcus septicemia.

This patient had no symptoms of endocarditis or of more than temporary arthralgia, and I believe that the prognosis is very good. I have seen only one case of gonococcus endocarditis, and in that patient the condition was superimposed on an old rheumatic heart. I believe that without previous cardiac damage localization of the gonococcus there is improbable.

## ADDITIONAL BACTERIOLOGICAL REPORT

A gonococcus fixation test was positive.

## DIAGNOSIS

Gonorrheal urethritis.  
Gonorrheal bacteriemia.  
Gonorrheal arthritis?

## CASE 13502

## A CONFUSING ABDOMINAL SITUATION

## SURGICAL DEPARTMENT

A married American woman forty-six years old was referred from the Consultation Clinic June 24 complaining of soreness in the bowels of five weeks' duration.

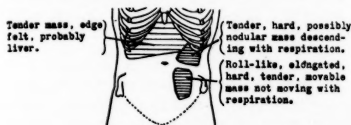
Ever since childhood she had been troubled with what doctors called "bad liver", i.e. she had periods of dizziness on stooping or on turning in bed, severe enough at times to keep her in bed for a week. Of recent years she had warded off severe or prolonged attacks by keeping watch for them and taking "stomach pills." For over five years she had been troubled with occasional attacks of upper abdominal discomfort and nausea of unknown cause relieved in a day to a week by dieting on crackers and milk and taking "stomach pills." These attacks tended to come when she was tired. She had a severe attack with vomiting five years before admission after the death of her mother, whom she had nursed for a year. Since this time she had never felt so strong as before. Three years before admission she had "intestinal gripe" all winter characterized by the passage of much mucus. In the spring this passed off. Seven weeks before admission a soreness in the midepigastrium developed. She was treated for gas, and passed a good deal by mouth and by rectum without relief. The soreness became progressively worse and moved down into the lower abdomen, becoming most marked just to the left of the umbilicus. There had been a progressive increase in constipation, which she had always had more or less. Mineral oil and enemas had very little results. The stools were very small, hard dark brown nubs. She had noticed no blood or tarry stools. She had eaten very little during the seven weeks, partly because she thought the soreness was less severe when she ate little. She had grown progressively weaker. A week before admission she gave up work. At that time she noticed a lump in the left lower quadrant which had persisted. Most of the soreness had been there. She had had transient periods of feverishness of a few minutes' duration. The soreness had been much worse when she sat up. Her sleep had been more and more disturbed by her abdominal pain. During the past three nights she had slept only a few hours. There had been no respiratory symptoms and no jaundice. She had had piles for twenty-two years, without pain or bleeding.

Her mother and one sister died of heart trouble. One sister was insane. Her father, a maternal grandmother and an aunt all died of cancer. One brother had kidney trouble.

She had a slight attack of scarlet fever in childhood. Nine years before admission she had influenza. For years she had chronic catarrh. Five years before admission she had severe burns of the hands, face and right arm from gasoline.

She was in bed for seven weeks. The scars still persisted. For three years she had had a full feeling behind the eyes in the morning, said by her doctor to be due to high blood pressure. For some years she had had numbness in her hand when she got up, but none during the day. The autumn or spring before admission she had "grippe." At this time it was discovered that her blood pressure was 180. She often passed very little urine and had to make a point of drinking six or eight glasses of water a day. Her heart pounded on exertion. She was able to climb only one flight of stairs slowly without dyspnea. A week before admission her blood pressure was 160. Five years before admission she weighed 200 pounds, after her attack of "grippe" three years ago 180. She had been dieting to reduce in recent years. On examination in the ward she weighed 177½.

Clinical examination showed a very obese woman with no evidence of loss of weight. She walked into the ward and showed no evidence of discomfort during the examination, but later was seen holding her abdomen as if in pain. Aortic second sound accentuated; otherwise heart and lungs not remarkable. Blood pressure 140/70. Abdomen huge, pendulous and difficult to palpate. Masses as shown in the diagram. Slight



umbilical hernia. Marked hemorrhoids. Pelvic examination: perineum torn, cervix lax, fundus questionably felt. External genitals, extremities, pupils and reflexes normal.

Before operation amount of urine not recorded, urine cloudy at three of four examinations, dark at one, specific gravity 1.034 to 1.022, a trace to the slightest possible trace of albumin at one of four examinations, a slight trace of sugar at two, 15 to 20 leucocytes and one to four red blood cells at one of four sediment examinations. Blood: 10,000 to 20,000 leucocytes, 69 per cent. polynuclears, platelets apparently normal. Wassermann negative. Icteric index 5. Blood sugar 128 milligrams. Vomitus: guaiac positive. Stools: guaiac positive at all of three examinations. Fasting contents of stomach: 13 cubic centimeters of thin watery material, guaiac positive, no free hydrochloric acid, total acidity 10. Test meal: 35 cubic centimeters of watery material with bread, guaiac slightly positive, free hydrochloric acid 18, total acidity 39.

X-rays. The transverse measurements of the heart were slightly beyond the maximum normal. The diaphragm was high on both sides. The transverse portion of the aorta was slightly tortuous. Examination with a barium meal showed the stomach in the usual position. Peri-

stalsis was somewhat sluggish. At the end of six hours the stomach contained about two-thirds of the motor meal. The gastric curvatures appeared smooth. No filling defects suggesting organic disease could be made out. The first portion of the duodenum appeared normal. The head of the motor meal at six hours had not advanced beyond the ileum. Most of it was in the jejunum. There was some apparent small bowel stasis.

Temperature at admission 100.2°, afterwards 98° to 99.5° until operation. Pulse before operation 76 to 99, respirations normal.

The patient complained of considerable abdominal pain. June 28 she was too ill for a barium enema. Two surgical consultants advised operation, although one of them thought the outlook bad. She vomited nearly everything, although she had taken no solid food for four days. June 29 she had much abdominal pain, requiring morphia. Rectal tap water and subpectorals were given.

July 1 operation was done. The patient went into shock immediately after it. Within twelve hours she was in coma. She grew steadily worse, and died the evening of July 2.

#### DISCUSSION

BY EDWARD L. YOUNG, JR., M.D.

We hear various descriptions of "bilious attacks." I do not think I have ever seen just this description of a "bad liver", assuming that by bad liver they mean what we generally are told is a "bilious turn."

Warding off severe attacks by taking stomach pills is another thing that makes me believe in the supremacy of mind over matter. Various people can take various pills, and they will always ward off attacks or do this and the other if taken in time.

DR. CABOT: They might be cathartic, and that would help.

DR. YOUNG: Yes, but they are not all. We have known of pills of various sorts which so far as we know did not do anything except what the patient wanted them to.

This patient apparently was one of those people who have the name of a great many diseases to tell one about, and who know a great many things, most of which are not so. Of course something that we call intestinal grippe does occur. I do not know just what it is. But I likewise know that a number of cases of "intestinal grippe" occur every year and particularly during epidemics of grippe, which die of ruptured appendix or of some other definite abdominal emergency, neglected because the diagnosis is "intestinal grippe." In other words, it is a bad term to use unless we have ruled out everything else.

The icteric index is normal. The blood sugar is just the upper limit of normal.

This is a woman with a great many things to tell about, and one thing which seems to stick



out prominently, and that is this recent trouble apparently in the gastro-intestinal tract. She had had these attacks for five years, of nausea, vomiting, and distress. That always suggests, in a woman of this build and this age, the possibility of cholecystitis. She never had anything definite enough so that there has been severe pain, for instance. It has been distress, and recently soreness. It starts in the epigastrium and then goes down so that when she reaches the hospital there is perfectly definite evidence, in spite of a large abdomen, of the masses described in the diagram. She has a positive guaiac in the stomach contents and in the stools. She has evidence suggestive of beginning obstruction in the lower intestinal tract. We have to recognize the fact that with any trouble anywhere in the gastro-intestinal tract the symptoms may be referred to the opposite end from the actual site of trouble. In the first place the epigastric pain should make us remember Mackenzie's localization of abdominal pain, that the higher in the epigastrium it is the higher in the small intestine the lesion is.

Then we have the tumor in the lower abdomen, which suggests, with the positive guaiac and the constipation, a malignancy of the sigmoid, metastatic in the liver, to explain the enlarged, tender liver. Why she should have positive guaiac in the stomach contents, vomitus, test meal, and fasting contents, is hard to explain unless there is a lesion at that point also.

The X-ray indicates either spasm or organic obstruction at the pylorus. Small bowel stasis of course is entirely consistent with obstruction lower down in the large bowel. The second plate is one of the chest and does not interest us, because I do not believe the disease was primarily in the chest.

She came in June 24, walked into the ward, and showed no evidence of discomfort during the examination. Four days later she is too ill for a barium enema. Apparently the condition, whatever it is, is making serious trouble. The only thing I can see that will explain that situation is a rapidly progressing obstruction from malignant disease. I cannot explain why she should have the first symptoms in the epigastrium and positive guaiac three different times from the stomach, if we are to assume, as I am going to, that this is a death from malignant disease of the sigmoid causing intestinal obstruction. The diagram of enlarged liver suggests strongly metastasis to that area. The hard mass that is tender and slightly nodular, descending with respiration, on the left side, is either a large nodule in the left lobe of the liver or a possible spread of the malignancy to the splenic flexure. The negative X-ray of the stomach would seem to rule out trouble there.

I shall be interested to know if Dr. Mallory will tell us that there is also evidence of biliary tract disease to explain her attacks, which might be due to cholecystitis. She became worse so

rapidly that the whole picture puzzles me as to why they did not either recognize that there was a rapidly increasing obstruction, or else if they did recognize it and thought it was hopeless, why they did not note it.

#### DR. YOUNG'S PRE-OPERATIVE DIAGNOSIS

Malignant disease of the sigmoid with metastasis to the liver.  
Intestinal obstruction.

#### PRE-OPERATIVE DIAGNOSIS

Abdominal tumor.

#### OPERATION

Gas-ether. Left paramedian muscle retracting incision. The abdomen was found to contain a large amount of free fluid. There was a thrombosis of some of the branches of the superior mesenteric vein, resulting in beginning gangrene of the loop of the small intestine. There was also some thickening and edema of the mesentery of the transverse colon. The gangrenous portion of the smaller intestine was incised with as wide a margin as possible. The edges of the gut were turned in and continuity reestablished by a lateral anastomosis. Exploration of the abdomen was not feasible owing to the poor condition of the patient. The wound was closed without drainage.

#### PATHOLOGICAL REPORT

A section of small intestine 45 centimeters long. There was a dark purplish red segment 27 centimeters in length in its center. The wall at both ends was apparently viable.

Infarction.

#### FURTHER DISCUSSION

They made no pre-operative diagnosis, as I have rashly done, of malignancy.

I wonder how one can make a diagnosis of mesenteric thrombosis before operation. That does not to my mind explain the tumor they felt. Perhaps it does. I think it is just a prominent manifestation of something entirely different. I think there is something going on which is the main thing, which has just as a final manifestation caused the vessel obstruction.

#### CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Mesenteric thrombosis.

#### DR. EDWARD L. YOUNG'S DIAGNOSIS

Malignant disease of the sigmoid with metastasis to the liver.  
Intestinal obstruction.  
Mesenteric thrombosis.

#### ANATOMIC DIAGNOSES

1. *Primary fatal lesions.*  
Carcinoma of the stomach.  
Metastases to liver and lymph nodes.  
Mesenteric thrombosis.

2. *Secondary or terminal lesion.*

Gangrene of jejunum.

3. *Historical landmark.*

Operation wound, jejunal anastomosis.

DR. TRACY B. MALLORY: There was cancer of the stomach, two ulcerated craters with indurated borders. Attached to and an integral part of the larger of these was a very large tumor in the mesentery and transverse colon, the greater portion of the tumor lying outside the stomach rather than in it. This tumor had by pressure and direct growth around the superior mesenteric artery and veins caused thrombosis both in the veins and in the arteries, with a resultant necrosis of the small intestine. There were abundant metastases to the liver, and otherwise nothing of interest in the post-mortem findings. The gall-bladder was entirely negative, no stones, the wall not thickened.

DR. YOUNG: What was that lower mass?

DR. MALLORY: There was no evidence.

LATER NOTES ON CASE 12473,  
PUBLISHED NOVEMBER 25, 1926

This case was published while the patient was still in the hospital. Psychological examination and treatment were continued until his discharge December 13 and afterwards during his stay in a nursing home. It was felt that he made slow but steady improvement for some time. Before the end of the summer, however, this ceased. He became blind, and showed some bulging of the eyeballs.

On September 16 he entered the Peter Bent Brigham Hospital with frequent attacks of profound somnolence alternating with periods of screaming. He died suddenly September 19.

Necropsy showed a large brain tumor, undoubtedly a pinealoma which had spread into the third ventricle.

Anatomic diagnosis: Brain tumor (pinealoma).

COMMENT BY DR. F. T. HUNTER: Perhaps more attention should have been paid to the abnormal spinal fluid, in view of the fact that very little has been reported concerning the spinal fluid findings in serous meningitis (Quicke's disease). I do not see how the diagnosis could have been made before localizing signs appeared.

BOSTON FEDERATED JEWISH CHARITIES CRE-  
ATES NEW DEPARTMENT OF MENTAL HY-  
GIENE

The Federated Jewish Charities of Boston announce the creation of a new department of mental hygiene with Dr. Jacob Kasanin as Visiting Psychiatrist directing the work. Dr. Kasanin comes well fitted to his new position. Following his graduation

in 1921 from the Medical School of the University of Michigan, he has devoted practically all his time to special work in psychiatry and neurology. He has been connected with the medical staffs of the Boston State Hospital, the Boston Psychopathic Hospital, the Judge Baker Foundation, and for the past year has been resident neurologist at the Mt. Sinai Hospital of New York City.

Assisting Dr. Kasanin will be Miss Martha Gorovitz in the capacity of psychiatric social worker. Miss Gorovitz graduated from Radcliffe in 1925 and from the Smith College School for Social Work this year, and has spent one year doing field work at the Boston Psychopathic Hospital.

A committee composed of the following has been appointed to assist and advise: Mrs. Maida G. Solomon, chairman; Dr. H. C. Solomon, Dr. Abraham Myerson, Dr. Charles F. Willinsky, Dr. Henry B. Elkind, and Dr. Maurice B. Hexter. The office of the Mental Hygiene Department for the present is located at the West End Jewish Community Center, 6 North Russell Street, Boston.—*Bulletin of the Massachusetts Society for Mental Hygiene.*

NEW JERSEY MENTAL HEALTH SURVEY

Concerned over the great increase of mental patients and the overcrowding of its hospitals for mental diseases, the Department of Institutions and Agencies of New Jersey has undertaken a statewide mental-health survey with a view to a better understanding of the problem and the employment of remedial measures. The number of patients increased from 3,579 in 1910 to 8,864 in 1923, and unless preventive means can be taken to check the increase at its source, in the community, the Department estimates that at the present rate a new 3,000-bed hospital will be required every ten years.—*Mental Hygiene Bulletin.*

LEGAL POSITION OF CONTRACEPTION ABROAD

In Belgium and France heavy penalties are imposed on persons advocating ideas inimical to the increase of the population.

In Germany contraceptive methods are penalized under a code controlling advertisements.

In Sweden and Norway birth control propaganda are discountenanced.

In America such propaganda are an offence against the Federal obscenity laws.

In Austria and Hungary the matter is not touched by legislation, but birth control has been increasingly practised during recent years.

In Holland birth control clinics, first established in 1885, are organized on a large scale.

In Russia the State provides instruction in birth control.

In Italy, Poland and Spain, the state takes no account of birth control.—*The Medical Press and Circular.*

WEEKLY HEALTH INDEX

Telegraphic returns from 68 cities with a total population of thirty million for the week ending November 26 indicate a mortality rate of 11.7 as against 12.1 for the corresponding week of last year. The highest rate (19.2) appears for Memphis, Tenn., and the lowest (4.6) for Somerville, Mass. The highest infant mortality rate (127) appears for Lowell, Mass., and the lowest for New Bedford, Mass., and Somerville, Mass., which reported no infant mortality.

The annual rate for 67 cities is 12.3 for the forty-seven weeks of 1927, as against a rate of 13.2 for the corresponding weeks of 1926.

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## BRADYKINESIA

SLOWNESS of movement, affecting the gait and with loss of associated movements of the arms, is one of the striking characteristics of the Parkinson syndrome, seen so persistently as a late manifestation of epidemic encephalitis. The phenomenon has recently been subjected to a series of critical tests by Professor A. J. Hall of Sheffield, England (*Lancet*, November 12, 1927), an author whose wide experience with the disease led him to publish an excellent account of his cases in book form in 1924, a review of which will be found in the JOURNAL for September eleventh of that year. Dr. Hall has devised a recording apparatus for testing a side-to-side movement of the arm and has examined seventy-three "Parkinsonians" in this way. Only one patient showed a normal rate of movement. Even the cases of short duration, with no complaint of slowness, showed a rate definitely below normal. Although there is a general impression that a Parkinsonian tires quickly, the records show that "flagging" could be demonstrated in only a few of the patients. The effects of belladonna or hyoscin hydrobromide therapy were evident, but the total increase of

rate of movement was at most about 25 per cent. of the normal rate and usually considerably less. The rate under mental stimulation was also increased, but not over 10 per cent. Hall believed, therefore, that "it is probably an exaggeration when Parkinsonians with pronounced slowness are said suddenly to make movements 'as well as ever they did in their lives'." The author found no adequate way to measure the "rigidity" except by a rough estimate. He concluded, however, in spite of the crude method, that "the stiffer arm is the slower arm," an impression often gained in the clinic. There was no relationship made out between an amount of muscular strength and the slowness of movement. The slowest man was the most powerful muscularly.

The experiments support the view that the primary seat of diminished rate of movement does not lie in the peripheral motor apparatus. It is probably in the central nervous system. The primary factor in causing the slowness of movement is partly masked by a secondary factor, a functional element, which may be removed by proper mental stimulation. In the older cases this functional element seems more pronounced, as is also the "rigidity," which may be due to changes in the peripheral motor apparatus.

Thus the causes of the disability are analyzed into three components: a primary cause in the central nervous system, a functional element, and the "rigidity," thought by Hall to be, possibly, due to changes in the outer motor neurons. Many workers in this country would make only two divisions of the disability, classifying the "rigidity" as the primary phenomenon, without definite changes, other than functional, in the peripheral motor apparatus. At all events, Hall has thrown new light on the field, and his analysis of the components of bradykinesia will, we hope, only be the starting ground for further investigations.

RESOLUTIONS ON THE DEATH OF  
DR. FRANCIS W. PEABODY

By the death of Dr. Francis Weld Peabody the Boston City Hospital has lost a distinguished member of its Staff. As Director of the Thorndike Laboratory, which was established to prove that the study of disease and research into its causes was as necessary a function of a municipal hospital as of one privately endowed, his success has become a part of the Hospital's history and the Thorndike Laboratory, under his guidance, has occupied a foremost place among institutions of its kind. His scientific imagination, intellectual capacity, mental balance and persevering zeal brought him fame as an investigator, while his generous encouragement of his Assistants and his appreciative support of their efforts created an organization which would re-

flect credit on any hospital. His brief seven years of service not only demonstrated the wisdom of the experiment, but it founded a tradition whose effect cannot be lost. His interest never flagged during his long illness, and through it all he remained the directing force. He never lost his sense of values in his enthusiasm for research, and in his relations with his patient he was preëminently the good physician. He healed when it was possible, but always he comforted. He was an eminent teacher for he sensed the difficulties of his students. Never didactic, he showed them the way to solve their own problems. Meanwhile he instilled the highest ideals of the art of medicine. His life was one of steady growth, and ever widening influence. His attractive personality and forgetfulness of self, his sympathy and understanding helpfulness, bound his colleagues to him with the strongest ties of affection. Young men found in him an inspiration, while the older leaders of the profession, in which he had become a master, saw in him the bearer of the torch which they were laying down. His life must be measured, not by the number of his years, but by the record of his accomplishments, and by the heritage of his example. His character combined the strong qualities of his New England ancestry, softened by tolerance and charity, and no where was it better shown than in the courage with which for months he faced the inevitable end.

The Trustees of the Boston City Hospital, in placing on record their appreciation of the high qualities of the man, and of his work, wish to express their realization of the great loss which the community has suffered. They share the sorrow of the multitude of his friends, and extend to his family their heartfelt sympathy.

#### A SERIOUS ACCIDENT TO DR. THOMAS J. O'BRIEN

On the evening of December third Dr. Thomas J. O'Brien, Vice-President of the Massachusetts Medical Society, was struck by an automobile, thrown some distance and then struck by another automobile. He was made unconscious but was soon able to ask to be taken to his home, where examination showed multiple bruises, torn muscles and sprains. Fortunately no bones were broken and there was no evidence of internal hemorrhage or other dangerous complications.

Dr. O'Brien will be confined to his bed for a time but his return to his usual activities is probable within a few weeks.

Dr. O'Brien, his personal friends, and the Massachusetts Medical Society are to be congratulated on this escape from more serious injuries.

We are especially pleased by the prospect of early resumption of the duties of the Vice-President for he has been a power in the activities of the Society.

#### THE RURAL MEDICAL PRACTICE PROBLEM

In another column the memorial appeal to the House of Delegates of the American Medical Association for consideration of the needs of isolated communities for medical service may be found.

This subject has been very generally discussed in medical meetings during the past few years. The facts set forth in the memorial have been accepted as true, but the remedy has not been discovered for no scheme has been perfected which seems to promise acceptance by recent graduates from whom rural practitioners may be drafted.

We take exception to the statement that "it is only in very rare instances that the son or daughter of a farmer can hope to enter the medical profession under prevailing conditions." This statement is meant only to indicate that a person without means will be unable to meet the expense of a medical education. We concede the handicap of poverty, but there are many illustrations of poor boys who are mentally well endowed who have taken full medical courses and graduated in good standing. The essential basic equipment of a student consists in intelligence, good health, and persistence. We believe that the young person with these qualities who is willing to put up with some hardships can get a medical education in a well-recognized medical school.

The difficulty lies in making a rural practice attractive to well-educated and ambitious young doctors. Who can blame a man for wanting to have the comforts of civilization and an income which will provide educational advantages for his children?

It is true that the spirit of the missionary may induce doctors to settle in small places at times, but there are only a few who will be moved by the example of Dr. Grenfell, and go to sparsely settled districts.

Until young men find the country more alluring, we fear that this demand for doctors in small towns will, only rarely, be met. The appeal presents the well-known facts, but no leader has appeared who can convert the barren wastes into lands "flowing with milk and honey". If this appeal to the American Medical Association is productive of a practical solution of the problem, there will be joy throughout the land.

#### THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

WHITE, JAMES C. A.B., M.D. Harvard Medical School 1923, Formerly Resident in Surgery at the Massachusetts General Hospital, now abroad at Strasbourg. Associated with him is:

HURXTHAL, LEWIS M. M.D. Harvard Medical School 1923, Formerly Resident in Medicine at the Massachusetts General Hospital, now in charge of medicine at the Lahey Clinic. Address: 605 Commonwealth Ave., Boston. Their subject is: "The Therapeutic Uses of Carbon Dioxide. A Summary of Its Present Uses in Medicine and Surgery." Page 1117.

GRABFIELD, G. PHILIP. A.B., M.D. Harvard Medical School 1915, Associate in Medicine at the Peter Bent Brigham Hospital, Instructor in Pharmacology at Harvard Medical School, Consultant in Medicine at the Boston Psychopathic Hospital. His subject is: "The Action of Iodides on the Nitrogen Metabolism." Page 1121. Address: 23 Bay State Rd., Boston.

JEPSON, PAUL N. B.A., M.S., M.D. University of Pennsylvania, 1920, Fellow in Orthopedic Surgery at the Mayo Clinic, First Assistant in Section on Orthopedic Surgery. His subject is: "The Orthopedic Care of Several Different Forms of Chronic Arthritis." Page 1124. Address: 240 Newbury St., Boston.

HANSON, JUSTUS G. M.D. Maine Medical School Bowdoin College 1898, Assistant Physician Northampton State Hospital 1898-1903, Staff Surgeon Cooley Dickinson Hospital, Northampton, 1908-1927. His subject is: "An Unusual Case of Rupture of the Uterus During Pregnancy." Page 1127. Address: 219 Elm St., Northampton.

BURNETT, FRANCIS L. S.B., M.D. Harvard Medical School 1906, Research in Nutrition, on Eczema and Psoriasis at the Massachusetts General Hospital, on Iritis at the Massachusetts Eye and Ear Infirmary and on Arthritis at the Peter Bent Brigham Hospital. His subject is: "Progress in Nutrition." Page 1128. Address: 205 Beacon St., Boston.

### The Massachusetts Medical Society

SECTION OF OBSTETRICS AND GYNECOLOGY  
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#### What Are the Contraindications to the Classical Caesarean Section?

In Massachusetts in 1923 and 1924 there were 984 puerperal deaths. 204 deaths followed Caesarean section, 133 being performed as an emergency measure. The probability is that the Classic type of operation was generally used. There were 592 fatal cases in which some form of operation was performed; so that about one third of the operated cases died after a Caesarean. In spite of figures similar to these from other States, the tendency is to widen the indications for abdominal delivery. Is it not better to stress the contraindications?

W. E. Welz in a paper on "Abdominal Caesarean Section in Detroit" published in the March number of the *American Journal of Obstetrics and Gynecology* remarks that "the contraindications are probably more important than the indications, as the mortality rates result mostly from performance of abdominal section when it should not have been performed.

(1) The presence of a dead fetus in the uterus is an absolute contraindication, unless there is such disproportion between fetus and pelvis that delivery through the natural birth passage would be impossible. (2) The presence of congenital fetal malformations which would be fatal at or shortly after birth are contraindications for a section. In cases of doubt a radiogram is essential. (3) Section for a premature fetus which is not viable, even though alive at the time of operation, is inadvisable. This is especially true of twin pregnancies in which both die shortly after delivery due to prematurity.

On the part of the mother contraindications are (1) toxemias, which are better cared for medically, (2) After prolonged labor, as Holland and Kerr have shown a maternal mortality of over 10 per cent. in this class. (3) After induction of labor where the mortality of Holland and Kerr was 14 per cent. (4) After attempt at forceps delivery where the same authors showed a mortality of 27 per cent. (5) During severe intrapartum infection, which are 50 per cent. fatal after section.

In considering the problem of abdominal caesarean section in Detroit, these facts must be reviewed: first, that the death rate in the city from childbirth has not materially decreased in years; second, that the rate of Caesarean sections is too high; third, that the death rate from sections performed is too high.

The narrow margin of time and safety for the classic type of Caesarean is well brought out by the bacteriologic study of the uterine contents in fifty cases from the Johns Hopkins clinic. This paper by Harris and Brown in the February number of the *American Journal of Obstetrics and Gynecology* draws the following conclusions.

"In nineteen elective sections performed at an appointed time at end of pregnancy and before the rupture of the membranes, the uterus was uniformly sterile.

The same applies to six cases in which the classical section was performed within four hours after the onset of labor.

In five patients in whom classical section was performed six or more hours after the onset of labor, bacteria could always be demonstrated in the lower uterine segment and there were streptococci in three of the cases.

Similar results were obtained in thirteen low cervical and six radical sections, and the uterine



contents were sterile only in the three cases in which the operation was performed within a few hours after the onset of labor.

These bacteriologic findings clearly show why the conservative section is safe only when performed at the time of election.

While vaginal examinations and premature rupture of the membranes undoubtedly increase the likelihood of bacterial invasion of the uterus, the absence of these factors in no way insures a sterile uterus.

Elevation of the temperature, likewise, is a valuable sign of intrapartum infection, but a normal temperature cannot be accepted as evidence that ascending infection has not already occurred.

Whether the presence of bacteria in the uterine cavity is due to the upward extension of bacteria already in the vagina or to an ascending infection from the vulva cannot be determined until comprehensive studies of the bacterial flora of the vagina have shown whether the occurrence of autoinfection is possible or not."

Questions of a similar nature to the above will be discussed in the JOURNAL each week. They may be addressed to the Clerk of the Committee, in care of the JOURNAL and will be answered by members of the Committee of the Section of Obstetrics and Gynecology.

### MISCELLANY

#### A MEMORIAL ADDRESSED TO THE HOUSE OF DELEGATES, AMERICAN MEDICAL ASSOCIATION

Cleveland, Ohio, November 24, 1927.

Gentlemen:

We, the officers and delegates attending the sixty-first annual session of the National Grange, assembled at Cleveland, O., and representing 800,000 members, who are engaged in agricultural pursuits, wish respectfully to bring to the attention of your association the growing scarcity of country doctors. It is our hope in so doing that your association may lend the weight of its influence to such readjustments and reforms in medical education as will serve to replenish the dwindling supply of country doctors and avert a general breakdown in rural medical service, which, unless present tendencies are arrested and corrected, appears to be inevitable.

According to the findings of a survey made for the General Education Board by Lewis Mayers and Leonard V. Harrison, published in 1924, there were approximately 33,000 physicians in places of 1,000 inhabitants or less in the United States in 1906. In 1924, according to this report, this number had been reduced to 27,000, showing an actual loss of 6,000 rural physicians in 18 years. More recent investigation shows that almost one-third of the towns of 1,000 or less, throughout the United States, which had physicians in 1914 had none in 1925. The average age of rural doctors throughout the country in 1925 was 52 years. Since the average age at death of American physicians is 62 years, it will be seen at a glance that the present generation of country doctors will have practically disappeared in another ten years.

With this situation staring us in the face, it is ominous, to say the least, that only a very small percentage of the medical doctors graduated during the

past ten years have taken up the practice of their profession in the rural districts. Careful inquiry reveals the fact that there are literally scores of rural counties in the United States where not a single doctor receiving his degree during the past ten years has settled.

In the meantime, we hear more and more of the increasing hosts in the rural sections who are "medically helpless", while the cost of medical service, where it is to be had, mounts higher and higher.

Notwithstanding this situation, we find that the Commission on Medical Education, which is now studying the subject, reports that with the medical school capacity we have in the country at the present time, and their graduates averaging 27 years of age, the number of physicians in practice is actually decreasing and that their number will not regain its present size of 130,000 until 1965. In the meantime, the population of the country, the Commission estimates, will have increased from 115 millions to 164 millions.

We glean from a published report of one of the committees at the last annual convention of the American Medical Association, held at Washington, that "the medical profession does not attract so many qualified young men and women as formerly." The report also notes that a dangerous concentration of doctors in cities is taking place, leaving the rural communities without adequate medical service.

The reason for this situation is not far to seek, and is hinted at by the committee in question. Under the minimum requirements which have been established, the prospective doctor must spend seven years after leaving high school in securing his education. Aside from the long period of pupillage, he must assume excessive financial responsibilities before he can begin the practice of his profession. This automatically operates to close the doors of the medical profession to thousands of those who possess all the natural qualifications to make them successful physicians under a more reasonable system of preparation.

It is only in very rare instances that the son or daughter of a farmer could hope to enter the medical profession under prevailing conditions. This holds true of people of average means in other walks of life.

We are in hearty accord with a distinguished former President of the American Medical Association, Dr. William Allen Pusey, when he says: "If the poor boy, who is used to the simple life and to effort rewarded only by the simpler luxuries, cannot enter medicine, who is going to do the ordinary work of medicine in the city or in the country? The man who can live without productive labor until he is 25 or 30 years old, who can spend \$8,000 or \$10,000 on his higher education, is not looking for an ordinary practice among ordinary people in the cities, or for any practice in the country."

If the supply of country doctors is to be replenished, these doctors must come from among the young men and women of the country districts, as was the case in former times. The type of graduates now being produced by our medical schools will not settle and practice in the country districts. This is conclusively proved by the experience of recent years.

The family doctor is rapidly becoming extinct. He is being supplanted by the specialist to a degree that is not warranted under practical conditions.

It is poor comfort to the expectant mother in the farm home to know that in the distant city there is an elaborately equipped maternity hospital, with specialists in obstetrics in attendance, when our system of medical education to an increasing extent compels her to rely upon a midwife or the friendly offices of a neighbor in facing her ordeal. It is not necessary to elaborate on this phase of the situation. Parallel illustrations will readily suggest themselves.

The need is for more general practitioners, whose outlay in time and money in securing their medical

education will be such that their services will be within the reach of the rank and file of the people, who constitute the overwhelming majority of our population, whether urban or rural.

We are not advocating one class of doctors for the country and another for the town. The country doctor, who is compelled to rely largely upon his own resources, without many of the facilities afforded in city hospitals, and without the advice of specialists, should be the best product of our medical schools.

Neither are we advocating any lowering of medical standards. What is required is more practical instruction, which may be acquired in less time and with the expenditure of less money than under prevailing conditions. We find that it is the opinion of many physicians of the highest standing that present medical education is not giving the most resourceful practitioners for ordinary service; it is producing practitioners who are dependent upon hospitals and laboratories, while these facilities according to authoritative medical opinions are necessary in hardly more than 10 per cent. of illnesses and accidents. It is in the care of this 90 per cent. of illnesses for which independent, resourceful physicians are necessary, that the rural communities are mostly in need. For the 10 per cent. of emergencies requiring specialists and hospital service, rural people can, perhaps, in most cases by an effort utilize urban facilities. However, the cost of these distant facilities make them impracticable by rural people except in cases of emergency. Because of their cost they are not practical for 90 per cent. of ordinary illnesses and accidents which, in the aggregate, produce the greatest sum of suffering, and whose early neglect leads to the serious emergencies. This 90 per cent. of illnesses cannot be handled through distant doctors and urban hospitals. If the people are to have adequate medical service, they must have physicians in their own communities.

The number of medical schools in the United States has been reduced from 160 to 69. Many of the smaller medical schools, which served a useful purpose, have been forced out of existence by highly endowed institutions, nearly all of which receive large appropriations of public funds. The direction and control of these schools has largely passed out of the hands of the people or their representatives.

The leaders of the medical profession and those who are charged with shaping the policies of these institutions are the guardians of a sacred trust. It is for them to recognize the difficulties of the situation into which we are so rapidly drifting and to propose a practical solution.

Failing in this, it is for the people to determine whether it would not be good policy, as necessity demands, for the States to build and maintain medical schools solely under public control and responsive to the needs of humanity.

We note that there are many distinguished physicians in the United States who believe that a proper medical education can be given upon the basis of a high school education and four years of subsequent training, provided this includes at least one year of practical experience in a hospital; that unanswerable evidence to confirm this opinion is furnished by the fact that many of the physicians of the highest standing in the country at the present time and an equally great number of your most useful servants of society, but of less distinction, scattered throughout the country, have had a training not exceeding this. If such a training will produce competent physicians, we think that the argument is unanswerable that such physicians will be less expensive and their services more widely available to the people.

We are, however, not undertaking to offer our opinion upon the details of medical education; our purpose is to emphasize to you our needs as we see

them. We wish to follow wise medical leadership, to escape if possible the mistakes of unwise legislation which might open the doors to all sorts of incompetents. But we feel that we should call the attention of the profession to the fact that we are compelled by force of circumstances to be concerned with the usefulness of the medical graduates that are turned out and their apparent failure under present conditions to meet the needs of rural communities.

It is pertinent to observe that it has taken about twenty years to bring about the present situation, and it will require some time to extricate ourselves from it. No time should be lost in prescribing remedies intended to effect a cure.

Various remedies have been suggested to relieve the situation with which we are confronted. But in the main these proposals call for mere makeshifts. They constitute an effort to deal with the effect without removing the cause of the shortage of country doctors. In our opinion, the only adequate remedy will be found in the adoption of a more rational system of medical education.

Again expressing the hope that your organization, to which the people have been accustomed to look for leadership in medical affairs, may recognize the urgent need of the reforms suggested and strive for their realization, we are

Respectfully yours,

THE NATIONAL GRANGE,  
L. J. Taber, Master.

Attest:  
C. M. FREEMAN, Secretary.

#### SUSPENSIONS OF THE REGISTRATION OF PHYSICIANS

At a meeting of the Massachusetts Board of Registration in Medicine the registration of Dr. Luke M. Holmes was suspended until further action of the Board on the charge that Dr. Holmes was guilty of gross unprofessional conduct in that he had entered into an agreement to perform an abortion.

The registration of Jacob Jacobson was suspended for one year.

At the same meeting the Board declined to restore the registration of Dr. Aaron W. Reibstein, who had been convicted of having performed an abortion. Dr. Reibstein is out of jail on parole and the complaint against Dr. Jose P. Vieira for alleged violation of the prohibition act was placed on file. (Dr. Freeman W. MacDonald's case was postponed.) The registration of Dr. Harvey A. Field was suspended for one month for alleged violation of the prohibition act.

#### PHOTOGRAPHING THE SPEED OF THE HUMAN BLOOD-STREAM

By the use of a device which records the presence of a ray given off by radio-active material, the motion of the human blood-stream is being measured and analyzed by Dr. Herman Blumgart at the Thorndike Memorial Hospital in Boston, Mass. This device, known as the Geiger Electric Counter, is so sensitive that it will detect the presence of emanations so weak that chemical analysis cannot bring them to light.

Radio-active preparations are injected in small quantities into the blood-stream of the patient, and with the Geiger apparatus are detected as they reach different parts of the circulatory system. A strip of motion picture film used in connection with a sensitive reflecting galvanometer, or a siphon recorder similar to those used in transatlantic telegraphy, serve to make records of the active material as it passes the point at which the Geiger detector is held.

The original apparatus was devised by Hans Geiger, a German scientist, in 1906, for the purpose of making quantitative studies of the emanations of radium. Recently, Dr. C. W. Hewlett, of the General

Electric Research Laboratories, improved the device, so that its indications are easily controlled and reliable.

The apparatus consists of a small brass chamber within which a very sharp platinum needle is held by an insulating collar. The chamber is closed at one end with a hard rubber plug and at the other by a thin aluminum plate, and a direct-current potential of 1500 to 2000 volts is maintained between the needle and the chamber wall. When a radio-active ray enters through the aluminum window, ionization of the enclosed air takes place, and in the intense electrostatic field at the point of the needle a current rush is set up that is many thousand times as large as that represented by the original ray. If some detecting device such as high impedance radio head phones, a string galvanometer, or a siphon recorder is connected in the high-potential circuit with the needle, the impulses set up by the ray can be read or recorded. By suitable amplification, the impulses can be built up to such an extent that relays may be operated, or a loud speaker made to register the sound.

The apparatus developed by Dr. Hewlett is contained in a box about three feet long and a foot square, and consists of a kenotron rectifier and filter equipment for supplying the high potential, and a special amplifying set. The Geiger chamber is portable, being encased in hard rubber and connected to the amplifier by a flexible cable. Chamber, cable and apparatus box are all carefully shielded to protect them from stray electrostatic disturbances in the room.

As used by Dr. Blumgart, one or several chambers are placed on various parts of the patient's body, radio-active material is injected into the blood stream, and the time of arrival is recorded on the tape or film. Since the active rays will penetrate the body without difficulty, readings may be taken at any desired point without making an incision.

In addition to its medical uses, the improved apparatus is being employed in the study of radio-active materials used in vacuum tubes, and also for checking up various theories in physical chemistry which have so far eluded experimental investigation.—*From D. O. Woodbury, News Bureau, General Electric Company, Schenectady, N. Y.*

#### THE DUTIES OF PHYSICIANS AND OTHERS WITH RESPECT TO THE TREATMENT OF ANY INJURY RESULTING FROM THE DISCHARGE OF FIREARMS

A. F. Foote, Massachusetts Commissioner of Public Safety, has issued a circular which is of interest to physicians and hospitals. In this circular a reprint of the Act appears which sets forth the duties of physicians, hospitals, and others, and which reads as follows:

1. Chapter 69, of the Acts of 1927, reads as follows:

An Act relative to Reports of Treatment of Certain Wounds Caused by Firearms.

Be it enacted, etc., as follows:

Chapter one hundred and twelve of the General Laws is hereby amended by inserting after section twelve the following new section:—Section 12A. Every physician attending or treating a case of bullet wound, gunshot wound, powder burn or any other injury arising from or caused by the discharge of a gun, pistol or other firearm, or, whenever any such case is treated in a hospital, sanitarium or other institution, the manager, superintendent or other person in charge thereof, shall report such case at once to the commissioner of public safety and to the police authorities of the town where such physician, hospital, sanitarium or institution is located. This

section shall not apply to such wounds, burns or injuries, received by any member of the armed forces of the United States or of the commonwealth while engaged in the actual performance of duty. Whoever violates any provision of this section shall be punished by a fine of not less than fifty nor more than one hundred dollars. Approved February 25, 1927.

### CORRESPONDENCE

#### A REVIEW OF "BONE SARCOMA," BY ANATOLE KOLODNY

227 Beacon Street, Boston.  
November 8, 1927.

Mr. Editor:

Several months ago you were good enough to send to my office the book by Anatole Kolodny on Bone Sarcoma, requesting me to review it.

As this book was published by the American College of Surgeons because it was a study largely of the material collected by the Registry of Bone Sarcoma of which I was chairman and furthermore because the book was dedicated to me by its author, I am not in a position to be an unbiased critic and I have personally told you that I should advise the JOURNAL to get someone else to review the book.

Of course, I think very highly of the book and have read it many times. In order to show you that it is not the trouble of reviewing it that I avoid, I enclose a copy of a letter which I have written to Dr. Crowell. I authorize you to utilize this letter and this copy of Dr. Crowell's letter as you see fit to publish them in whole or in part as separate or combined in the form of an article on Bone Sarcoma or abstracted as a review of the book.

I return the book as you may wish to send it to someone else to review.

Sincerely,

E. A. CODMAN.

October 4, 1927.

Dear Dr. Crowell:

As I promised you sometime ago I have reviewed Kolodny's book page by page and sentence by sentence, with a view of detecting flaws of any kind but especially any misstatements of facts or omissions of even trivial points known about primary malignant tumors of bone. I have read the book carefully several times before and at each reading have been more and more impressed by its real value. In it is compressed all the transmissible knowledge that mankind has about the subject and every descriptive statement can be substantiated by illustrations from registered cases. It can be truly said that anyone who can prove anything to be an error which Kolodny has stated as a fact, or who can add any new fact illustrated by a registered case, will have made a worthy contribution to this branch of science. Furthermore, such negative or positive additions to this book would be contributions to science in general because the method pursued in the making of this book can be applied to many other subjects not only pathological and surgical but in kindred sciences. To have a permanent impersonal collection of case data as you have in the Registry, which together with the literature has been studied in detail and presented in book form for future students to build on or prove erroneous is a new departure in medical science. The literature and your case histories are as free to any future student as they were to Kolodny, who entirely unsolicited studied all the data of each case and wrote his monograph. After I had called your attention to it, you obtained Kolodny's consent to its publication by the College and it is greatly to your credit that you persuaded the Regents to do this. I believe this

book to be the first of a new form of medical literature: new facts can crystallize around it and its second edition by a new author who has studied the Registry Collection five years from now will still further impersonalize it. In my opinion it will be a long time before any important addition or subtraction will be made. I have myself studied every case in the collection many times and reading the book as critically as I can I find only one point of sufficient importance to question its deletion and only two points to bring up as possible additions to our knowledge of the subject. On page 138 in speaking of the question of whether or not Ewing's sarcoma arises in single or multiple foci he gives the impression that he favors the idea that the multiple tumors are primary. To my mind since there are three registered five year cures following amputation out of 40 cases of Ewing's sarcoma it seems likely that a primary focus is the rule. Kolodny himself would probably agree with me and be willing to admit that page 138 gave a false impression of his own ideas.

The two points which might make slight additions to the science of the subject are as follows: On page 205 he states that the reason of recurrence after curetting of giant cell tumors is not known. In my opinion this is due to failure to destroy the main nutrient artery and its canal which enters the tumor. I believe a giant cell tumor is always a pulsating finely meshed vascular sponge whose minute spaces are in direct communication with the lumen of the nutrient artery. Removal of portions of the sponge would theoretically do little good while destruction of the nutrient artery and its canal would stop the pulsation and allow the tumor to regress and become cystic fibrosed, or ossified. I base this belief on certain desiccated specimens in the Warren Museum which show such nutrient canals entering the tumor space. I found these specimens after I had evolved the theory from the microscopic structure and clinical histories of the registry cases. The specimens confirmed my belief but I have not had an opportunity to verify the fact at operation. This may fall to the fortune of some other student.

Another point concerning giant cell tumors not brought out by Kolodny although I am sure he knows it, for I have talked with him about it, is a theory for the interesting fact that invasion of the medulla by these tumors stops abruptly close to the point where the shaft ceases to appear expanded. Why should a tumor thus expand solid cortical bone and yet not progress up a soft marrow cavity? I believe the explanation is the same as that of the fact that beating marble will wear a hole in it faster than in rubber. The normal medulla is pulsating with the blood pressure; so is the pulsating sponge of tumor. They nearly equalize because each has the same blood pressure. The walls of the cortex however are hammered slowly away by the pulsating tumor and a new bone shell keeps forming, being in turn destroyed. This explains the structure of the tumor but not the more interesting point of why the balance is maintained between the pulsating medulla and cortex in normal bone. The difference between the pulsation of the marrow and that of the tumor must be very slight but that it is slightly in favor of the tumor is shown by the fact that the convexity of the demarcation of the two is always toward the medulla. Yet this difference is enough to slowly dissolve the cortex. It seems reasonable to believe that this difference may vary slightly with the calibre of the nutrient vessel and vice versa that some estimate of the aggressiveness of the tumor might be made by observing the degree of convexity. See figure 78 and 80 in Kolodny's book. No doubt the calibre varies greatly and the tumors cease to grow when the vessel is for any reason occluded.

These are, to be sure, rather trivial points and perhaps too poorly supported to be mentioned in

an authoritative book. I have made a few notes of still more minute nature. Some false impressions are given by Kolodny's use of English. It is hard for an American reader of this book to realize that five years before it was written Kolodny knew no English at all. Born in Russia, receiving his medical degree in Switzerland in 1914, he enlisted immediately in the French Army and after a time was transferred to the Russian Army. Later he was a prisoner of war in Germany for two years. Thus he had had no opportunity to study English until coming here in 1921. Fortunately his experience as a prisoner fitted him for this study for he was assigned as an assistant to the great pathologist Lubarsch who recognized his ability and trained him as a pathologist. One sees the advantages and disadvantages of his German training in this book. The thoroughness of the plan of the book and the detail in each division more than compensates for the occasional difficulty one has from the construction of his English sentences. For instance on page 172 "the giant cells containing new growth observed in the course of osteitis fibrosa" is puzzling to the American reader who is ignorant of German construction. He would readily understand the same words in the sequence we should use them, i. e. "the new growths containing giant cells observed in the course of osteitis fibrosa." On the whole however it is remarkable to find his statements clearly expressed in our complicated language. Some paragraphs contain brief sentences each expressing a descriptive fact and the sequence is so regular as to suggest machine gun fire. Page 193 is an example. In seventeen lines are compressed facts which have taken weeks of study to select.

The book is great enough to omit praise and to justify petty criticisms if they point out little errors which may be polished away in a second edition. I therefore call attention to the following which seem to me of some although very little importance. p. 24 "myeloma is the only true round cell tumor occurring in bone." I should say that myeloma cells are more often roughly cuboidal or polyhedral. One should remember too that Ewing's sarcoma was formerly called round cell sarcoma and that the average superficial observer on seeing the round nuclei and not observing the frequently imperceptible cell boundaries would consider them "round celled". Kolodny is perhaps right but the statement needs some qualification. He does qualify it later on p. 158 but not sufficiently, and the illustration on that page shows loosely arranged roughly cuboidal cells. Page 110, Plate 17 is that of a rather extraordinary case and its presentation here is an exception because the case was never registered. Such an extraordinary case should be registered and it seems to me a mistake to utilize it in this work, because other students of the Registry material cannot also study it and agree or disagree.

Page 187. I do not think that Ewing and Wright intended this interpretation of certain cases of giant cell tumor (e.g. case 5) which contain cartilage cells. As I understood Wright he considered the cartilage cells as remains of the normal epiphyseal line which had been broken by the tumor, not as aberrant islands of epiphyseal cartilage giving rise to the tumor.

In the matter of treatment, I do not think Kolodny is optimistic enough and is somewhat too logical. It would be possible in another edition to give a clinical illustration of a remarkable and encouraging result in the case of each of the large classes of primary bone tumors, treated respectively by surgery, radium and X-Ray. There are a few such well authenticated cases and every one who treats a case of bone tumor would be glad to know of them.

I am inclined to think Kolodny is not logical in his statements concerning the use of Coley's toxins. It is an undeniable fact that Coley has registered more cured cases than anyone else and while most



of them have had amputations as well as toxin treatment and perhaps radiation, one cannot exclude the value of the toxins until the rest of the profession have been able to register as large a percentage of cures by amputation alone. I have little faith in the toxin treatment but it is illogical to dismiss it as yet. Statistics are in its favor rather than the reverse.

Kolodny is inclined to favor radiation versus amputation. It does not seem to me that he considers the human side enough. I personally feel that amputation is the treatment of choice in osteogenic and in Ewing's sarcoma. I recommend it not because it may often save life but because it saves suffering and gives a respite. When radiation technique has developed so that recurrences or metastases can be permanently removed I shall give up advising primary amputation. Furthermore there are a few authentic cases where amputation was successful and as yet no cures by radiation. There will be enough cases who refuse amputation to try out the new methods.

There is one thing I especially admire about this book and that is the clear distinction which is made between what we know and what we do not know. In many parts of the book the gaps in our knowledge are clearly indicated. Kolodny has made for the next generation a crossword puzzle which gives the facts now known about his subject and has left wide open definite blank spaces for future students to fill in. Such facts with illustrative registered cases are wanted by the Registry at 40 East Erie Street, Chicago.

I wish you could get the other members of the Registry Committee to write you similar letters after critical reading of the book to show definitely exactly which statements they are inclined to disagree with or doubt.

The changes suggested by Kolodny for our classification seem to me desirable especially the use of the term Ewing's sarcoma rather than Ewing's tumor for if we wish the term giant cell tumor to be educational as showing benignancy we should certainly use the same practice in speaking of Ewing's sarcoma for it is very malignant.

Sincerely,

E. A. CODMAN.

#### COMMENTS ON ADVERTISING IN MEDICAL JOURNALS

Mr. Editor:

The editorial "California Fruit Growers to Rid the World of Acidosis" in the November 17 issue was a commendable statement.

Of course the attempt of commercialism to seduce legitimate medicine is not new. In recent years these attempts seem to appear in a different and more subtle guise, the Life Extension Institute perhaps the most subtle of them all.

No process has yet been devised which will make a permanent solution of oil and water.

Respectfully,

W. H. MERRILL.

#### THE ACTION OF THE DEPARTMENT OF PUBLIC HEALTH WITH RESPECT TO CLINICS AND SIMILAR INSTITUTIONS

December 5, 1927.

Mr. Editor:

By statute the Department is required to license any establishment run under the name of "clinic, dispensary or term of like import" whether for charge or not. This is obviously very broad. Last summer an investigation was made of a considerable number of clinics in this State, some of which had not been

licensed. As a result, the Department has adopted rules and regulations which cover the various essentials for medical and surgical service to the sick. It will be noticed that these do not apply to the many forms of clinic service being offered to well individuals. Because of the wide difference in this type of service it was difficult to draft regulations which would be generally applicable. As time goes on the rules and regulations may well be modified.

Yours truly,

GEORGE H. BIGELOW, M.D.,

Commissioner of Public Health.

#### THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

##### *Rules and Regulations for Dispensary License*

(1) A licensed physician shall be in attendance at each clinic session where medical or surgical service is given and must see each case.

(2) A registered nurse shall be in attendance throughout the clinic period at which medical or surgical service is given.

(3) Two rooms, one for a waiting room, the other for examination and treatment, shall be provided where medical or surgical service is given.

(4) Running water and apparatus for sterilizing instruments by boiling shall be available.

(5) An individual record shall be kept on each case.

(Approved by the Massachusetts Department of Public Health November 22, 1927, under the provisions of General Laws, Chapter 111, Section 54.)

#### NEWS ITEMS

**THE \$1,000,000 FUND OF THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER**—The campaign to raise one million dollars for a fund to be used by the American Society for the Control of Cancer has been successful. The endowment will assume a minimum budget of \$50,000 a year.

Dr. George A. Soper, Managing Director, reports that the educational bulletin which had been published daily for two weeks may have reached approximately 19,000,000 persons daily. The educational campaign has apparently reduced by twenty per cent. the time interval between the discovery of cancer and the application of proper treatment.

**DECLARES MENTAL DISEASES ARE CURABLE**—Dr. Winfred Overholser, Director of the Department of Mental Diseases, Division for Examination of Prisoners, stated in an address at a recent meeting that mental diseases are curable and that persons should not be ashamed of mental illness in their immediate families. Dr. Overholser believes that typhoid fever is more a cause for shame since this disease can in a large measure be prevented. According to his report, but twenty-four per cent. of the patients received at State Institutions remain at the end of a year.

**CAMBRIDGE HOSPITAL DRIVE SUCCESSFUL**—The recent drive for \$750,000 to build three new units between the present plant and the Charles River has been successful. The campaign total was \$750,262. The new units will include a nurses' home, children's hospital, and private patients' building. It is hoped that these additional buildings will enable the Cambridge Hospital to become even more efficient in its treatment of humanity.

**A NEW BOSTON CITY SANATORIUM**—Mayor Nichols announced December 6, 1927, that plans are being made for the erection by the city of Boston



of a new sanatorium which will cost about \$1,000,000. This plant will be developed under the direction of the trustees of the City Hospital.

The hospital will be a part of the Mattapan Sanatorium administration, but will be apart from the present building. It is planned to have 125 beds which will provide largely for incipient cases, thereby relieving the patients of the feeling that only advanced cases are received for treatment.

Even with this addition it is expected that Boston will have to take advantage of State institutions for some cases.

**PHYSICIANS' NIGHT AT PROFESSIONAL WOMEN'S CLUB**—At a recent meeting of the Professional Women's Club more than 200 members and guests attended Physicians' Night. Dr. Agnes G. Lake, chairman of the committee on arrangements, presided. An illustrated lecture of his personal experiences was given by Medical Examiner Magrath. Miss Gertrude Spitz, dietitian of the out-patient department of the Massachusetts General Hospital, gave a talk on "Foods and Fads." A buffet luncheon was served.

## NOTICE

### UNITED STATES PUBLIC HEALTH SERVICE

CHRONOLOGICAL LIST OF CHANGES OF DUTIES AND STATIONS OF COMMISSIONED AND OTHER OFFICERS OF THE UNITED STATES PUBLIC HEALTH SERVICE

NOVEMBER 23, 1927

A. A. Surgeon C. S. Wright. Directed to proceed from Portland, Me., to Searsport, Me., and return, to conduct quarantine and immigration examinations on Swedish Steamship Eros. November 12, 1927.

Assistant Surgeon A. S. Rumreich. Relieved from Rolla, Mo., effective December 1, and assigned to duty at the Hygienic Laboratory, Washington, D. C. November 15, 1927.

Assistant Surgeon General (R) W. S. Terriberry. Directed to proceed from New York, N. Y., to Saranac Lake, N. Y., and such points in New England and New York State as may be necessary, and return, to investigate a claim for the Employees Compensation Commission. November 17, 1927.

Surgeon M. H. Neill. Relieved from duty at San Francisco, Calif., effective December 1, 1927, and assigned to duty at San Diego, Calif. November 17, 1927.

Surgeon J. F. Worley. Relieved from duty at San Diego, Calif., upon arrival of Surgeon M. H. Neill, and assigned to duty at San Francisco, Calif., Marine Hospital No. 19. November 17, 1927.

Assistant Surgeon General F. A. Carmelia. Directed to proceed from Washington, D. C., to Marcus Hook, Penna., and return, to conduct tests in connection with floating equipment at that station. November 18, 1927.

A. A. Surgeon Daisy M. O. Robinson. Directed to proceed from Albany, N. Y., to Washington, D. C., and return, for conference at the Bureau in connection with venereal disease control measures. November 17, 1927.

Surgeon A. D. Foster. Directed to attend meeting to be held by Seaboard Medical Association in Norfolk, Va., on December 6, and deliver an address. November 21, 1927.

Official:

H. S. CUMMING, *Surgeon General.*

## REPORTS AND NOTICES OF MEETINGS

### PLYMOUTH DISTRICT MEDICAL SOCIETY

The regular November meeting of the Plymouth District Medical Society was held Tuesday, November 29, at which time the Society was entertained by the Brockton Hospital. About forty men attended.

The first half of the meeting was taken up by the members of the Hospital Staff, who showed several cases, demonstrated certain apparatus, and presented X-rays showing various pathological conditions. These included: (1) a case of intestinal obstruction caused by a gall-stone nearly as large as a pullet's egg; (2) demonstration of new apparatus for fracture of the femur and for the treatment of fracture of the humerus; (3) a series of plates showing dislocation and fracture of the vertebrae; one with manipulative reduction; (4) several cases of hydro-nephrotic kidney; (5) an old osteomyelitic abscess of the tibia of about 18 years' duration, only recently operated; and (6) a perforating gastric ulcer with barium present entirely outside the stomach.

The last half of the program consisted in a very thorough discussion of the diagnosis and treatment of Poliomyelitis by Dr. E. H. Luther of Boston. He considered the causes, certain experiments with the cause of virus, the mode of entrance and to some extent, the mode of transmission. He also considered that many were apparently immunized naturally and thought that to set out to stop contacts between people who had it and those who did not, was extremely impractical. He then considered the pathology and described the onset and course of the disease particularly prior to the onset of the paralysis, and stated that he felt that its start was quite characteristic and that if treatment could be instituted prior to the paralysis that the death rate and amount of paralysis would be greatly diminished. He relied principally upon the use of convalescent serum giving 20 ccs. intraspinally the first day and also 20 ccs. into the vein that day, and 20 ccs. more intraspinally on the second. He said that in these early cases it was necessary to rule out certain conditions seen in tonsillitis, in otitis media, in pneumonia, and in meningitis arising from tuberculosis, syphilis and other forms of encephalitis. These latter at times were somewhat confusing, but the spinal fluid was a pretty sure index of the condition present. In relation to the spinal fluid, he said that in these cases of paralysis: 1. the pressure was usually increased; 2. the cell count usually ran from 50 to 250, but might be seven or eight hundred; 3. the serum globulin was increased; 4. the sugar content was normal; 5. the serum had a "ground glass" look. In closing he also mentioned a particular condition in which stimulation was to be avoided and that was when the paralysis was apparently going on to cause death because of its effect on the respiration. In this case morphia rather is indicated. It is really an air hunger and the patients are already stimulated as much as possible.

After a short discussion of Dr. Luther's paper, the meeting adjourned to lunch at the hospital dining room.

### THE ANNUAL MEETING OF THE SOMERVILLE MEDICAL SOCIETY

About forty members of this society met at the Elks' Hotel on the occasion of the annual meeting and elected officers as follows: President, Dr. E. H. Robbins; vice-president, Dr. J. E. Gillis; secretary, Dr. C. K. Sweeley; treasurer, Dr. A. H. Blake. Dr. Herbert Chelorton presided and introduced Dr. T. J. Leary, the orator of the evening, who spoke on "Early Legal Medicine in America."

ANNUAL MEETING OF THE MASSACHUSETTS  
SOCIETY OF EXAMINING PHYSICIANS

COPLEY PLAZA HOTEL, BOSTON, WEDNESDAY,  
MAY 25, 1927

The following were elected Officers for the ensuing year:

President: Dr. Charles P. Sylvester, Boston.  
Vice-Presidents: Dr. E. Dwight Hill, Plymouth;  
Dr. Joseph A. Mehan, Lowell; Dr. George W. Morse,  
Boston.  
Secretary: Dr. Wm. Pearce Coues, Boston.  
Treasurer: Dr. R. C. Gwin, Boston.  
Executive Committee: Dr. Constantine Popoff,  
Haverhill; Dr. William A. Bishop, Boston; Dr. J.  
H. Shortell, Boston; Dr. F. H. Gardner, Boston; Dr.  
Thos. J. O'Brien, Boston.

After dinner the following program was carried  
out with Dr. Leary presiding:

1. Dr. Stewart Rooney—Finger Prints and Identification Methods. Discussion: Drs. Brickley and Hartung.
2. Dr. William J. Brickley—Identification Methods in Some Recent Cases.
3. Dr. Timothy Leary—Alcohol.

DR. ROONEY: A great deal has been written about the possibilities of fingerprinting. The people of India have been doing it for the last two or three hundred years. It was adopted in England around 1898 and in this country in 1899 or 1900 but was ridiculed at first. It was not until about 1906 that it was adopted seriously in this country. Boston was one of the first cities to accept it. I believe Lowell took it up before Boston did. After Lowell, Boston, Brookline and some of the other cities around Boston saw its possibilities and studied it with a good deal of interest. It was taken up in New York and Chicago about the same time. On account of the earthquake and fire in San Francisco they were a little later in accepting it.

In explaining how fingerprints can be read I will show you some photographs. As you know, we are born with prints on our fingers and with creases in our hands. You can see the creases when you close your fingers in your hands. Between those creases, particularly on the tips of the fingers are what are known as ridges. These ridges are the ends of the glands which supply perspiration. From the day of birth until several days after death the fingerprints never change. The fingerprints you are born with are still on your fingers until the body is wholly disintegrated. The same holds true of those on the bottom of the foot. It is the only means of identification in the life of an individual that does not change. That is of value, not only in the criminal sense but it is of value to the medical man, in the hospital, particularly in children and maternity cases where there is a possibility of having the babies mixed up. It is important in insurance work. I happened to see a policy of my own taken in 1916 with the Prudential Company and my fingerprint is on that policy. That is just an incident. I don't know whether the Prudential has adopted the practice or not. The United States army developed fingerprinting to a high degree in the course of the war. It is useful in court work, in the identification of wills and legal documents. It is used in the Far East, especially in Japan and China in writing checks. Instead of putting his name at the bottom of a check a man puts his fingermark. They have an expert in the banks to read fingerprints. He can tell at a glance whether the signature is genuine. In work like Dr. Leary's if we had universal fingerprinting it would be possible for some one who had lost a child or relative to go to Dr. Leary and say, "Here is a fingerprint of my missing relative, and if that

person is brought into the morgue kindly let me know." This would save a lot of running around by people trying to locate their friends.

Fingerprints have four characteristics. There are loops, ridges, whorls and composites. Composites are a combination of the three, that may group themselves into one fingerprint. It has been figured out that there is only one chance in 64,000,000,000 of two fingerprints being identical. That is on one finger. Now if you have all ten fingers you have the cube of ten times 64,000,000,000, so you have a very remote chance of some one else having the same prints as yours.

Loops make up a great proportion of the fingerprints, about 60%; whorls make up about 35%, leaving the other two classes so small that we don't bother with them. In classifying them they are called loops and whorls. If the classification happens to fall on the thumb finger they are given numerals in rotation of 16-8-4-0. Fingerprints are read taking two digits at a time. You can have only 1024 classifications on the ten fingers. The square root of that is 32. In reading fingerprints you use the combination from 1 to 32 for the first five fingers and 3 to 32 on the others and your cross mathematics will give 1024 for all combinations. No two people have the same ridges. Some investigator has worked out the fact that there are only nine possibilities as far as ridges are concerned.

The Captain here tells me that an expert can read fingerprints in fifty seconds and if a fingerprint comes into the office the man at the telegraph can put that all over the United States in two hours and if each police department has a classification of fingerprints in its possession the man can be identified in but little more than that time and there is only one chance in 64,000,000,000 of a slip. There is an art in taking fingerprints. They must be done properly and they must be classified properly and that is a very interesting problem.

One of the gentlemen who is going to discuss my paper has classified his own fingerprints, and here is the picture. That is a print he took when he was being examined for his classification as a fingerprint expert and on that one print he has fifty different ridge characteristics. The chance of anybody else having those same characteristics in that particular spot are pretty slim. The Captain has very kindly let me have some prints from the department to show something of the type of work that is carried on here in Boston and it is a great deal like this throughout the country.

They have the fingerprints placed on a sheet of paper and classified and then the photograph of the criminal if obtained is placed there with a description corresponding as accurately as possible with his appearance; and these are mailed all over the country and each police department takes this particular card and files it away with its system of classification.

In the West we don't have a medical examiner, but the medical work is done by the coroner, a man elected by the people. He may be a good man or he may be indifferent and if he is awfully bad he may call in a doctor to help him. The criminal work is done by the police department and it was my job to handle all murders and suicides.

One case that undoubtedly got into the eastern papers was that of "Bluebeard". He admitted more cases than we were able to prove. He was a Sadist, never having had intercourse in the normal way. He used a two-edged knife and used to stab a woman below the breast and have intercourse. He would live with a woman two or three months; he always picked out one that didn't have many relations so that he could get rid of her in a short time. You will notice that to complete his job he used to hit his victim on the head. You men in the medical profession know if you have air in the thorax and no

blood in the abdomen a body dries up. As he stabbed this woman (indicating photograph) the knife went through the thorax upwards, accompanied by a thrust that went through the abdominal cavity. After he hit her in the head the blood went to the head and the body all dried up and he buried it under some stones. The body was found by two small boys, and it was brought into the police department and turned over to me to see what I could make of it. I must confess that it was not for my own interest that I identified this body, but we never leave a clue untouched. So I noticed a bridge in the mouth, and we were able to find the dentist who identified the bridgework and we identified the woman with the aid of the dentist. In this case the first thing to do was to restore the body to natural size. Here is a photograph, after having been placed in chemical solution so that the blood would take up a certain amount of fluid. I learned this method through several books on mummies that have been restored. I obtained my chemical material from the work that had been done there. Here is another photograph. The hair was found alongside the body, by the way. That body had been dead for a year and eight months approximately, yet the fingerprints after the restoration were just as plain as they had been at any time during her life. So you can see for yourselves that even fingerprints of mummies can be read by a good man. On monkeys placed in zoos you can get perfect fingerprints.

DR. HARTUNG: I don't know how any one was informed that I knew anything about fingerprints. I have kept it under cover as it was more or less of a hobby with me, but I have been interested in it for eight or nine years as a side issue and have become so fascinated with the subject that I took an intensive course, and I think I gained my most valuable information on the subject from a former fingerprint expert of the New York City police, Mr. Keene, who has written a very interesting book on the subject. The subject is so broad and so big that it cannot be covered in an hour's time and it cannot be rightly discussed in fifteen minutes. I have made a few notes in connection with the able discourses by the previous speakers on the subject and perhaps can tell you a few little items that might interest you because of different viewpoint. There are two sides of the fingerprint identification proposition. One is the criminal aspect which has been handled successfully in Paris by the police department and at Scotland Yard and New York City.

The department in Canada I think has the finest or next to the finest fingerprint organization in the world, namely, the department of the Northwest Mounted Police. I visited this place four or five years ago. I allowed myself, with considerable pleasure and interest, to be fingerprinted in the department and two sergeants were detailed to the job. Two sets of fingerprints were taken and one man was sent into one room and one into another to make the classification. One man filed my set of fingerprints away amongst twenty-five or thirty thousand other fingerprints, including Ponzi's. I was shown Ponzi's fingerprints there. That is, I think, where the Boston department got its identification of Mr. Ponzi. To show you how quickly an identification can be made: The sergeant on the outside of the room, after the other sergeant had put my fingerprint identification away in the cabinet, was called into the room and by the watch in thirty seconds had my identification papers outside of the cabinet absolutely verified.

The other side of the fingerprint proposition which some day is going to be more or less universal is the possibility of personal identification of every individual in the country—a broad subject. Probably it will never come in our day because it is such

a big proposition. When you stop to think of fingerprinting 125,000,000 or more people it would be a task almost too big to estimate, but there can be departments of identification in large cities whereby people can have their fingerprints taken and put away for purposes of identification. The chief difficulty up to the present time has been that so many people have a fear about having their fingerprints taken on account of the fact that up to within a few years it has only been used by police departments and they suspect that it puts a stigma upon them, but I must say that there is no reason now why anybody should be afraid to have fingerprints taken since it is the only thing that we are absolutely sure of for proper identification of an individual in many cases of accidents, for instance, where the features or the clothing may be destroyed. In such cases an identification can be made absolutely, provided the person's fingerprints are on record in some bureau.

Dr. Rooney spoke of the work done by the United States army during the late war. I talked with one of the commanding officers of one of the regiments of marines that was in action in France. He told me of hundreds of young men belonging to his organization who had been killed, whose identification tags had been lost and nothing found in their clothing to give any clue and yet many hundreds of those men who died on the other side were absolutely identified by means of the fingerprints on record in the bureau at Washington.

Many of the savings banks are now using either the thumb impression or index finger impression of the right hand for identification of savings accounts where people are unable to write their names. A few of the banks in Boston have that system; a great many in New York City and Chicago; the postal savings banks in connection with the United States Government. Another thing I think will interest you particularly is the use of fingerprints of mothers and footprints of new-born babies in the maternity hospitals. We all know that mistakes sometimes happen in these institutions where there are so many babies and they are taken out and given their morning bath and fixed up and returned to cribs next to the mother of the child, supposedly. Occasionally mistakes are made by the nurses despite the tags and everything that goes with the service; so that a few years ago some of the maternity hospitals and some of the fingerprint experts decided there was an opportunity to use fingerprints of the mother and footprints of the new-born babies for the purpose of absolute identification. This was first started in the maternity ward of the Mt. Sinai Hospital in New York City and was taken up by one large hospital in Philadelphia, also in Chicago. I corresponded with several of these hospitals and received some very valuable information. The best information that came to me, however, was from the Bridgeport Hospital in Bridgeport, Connecticut, where Dr. John Bresnahan, with whom a good many of you are acquainted as he used to be in the City Hospital, is superintendent.

He organized a system of fingerprint of mothers and footprints of new-born babies and it is being carried on right along at the present time. I spent a very pleasant and instructive day with Dr. Bresnahan several summers ago studying his cases. I have a copy of one of the cards that was taken while I was there and I thought it would be particularly interesting to you so I brought it along as well as some other ordinary fingerprints that I have taken in the past five or six years. Just a word in regard to the procedure used in maternity hospitals. They have a regular fingerprint and footprint card. Before the mother is delivered the impression of her right thumb and index or middle fingers are taken on one side of the card. Then the right footprint of the new-born baby is taken im-

mediately after birth and toilet has been completed and placed on this section of the card. When the mother and child are discharged from the hospital the thumb, index and middle fingers' impression are taken of the baby and another footprint is taken of the baby and they are all checked up with the name, date of birth, weight of child, etc. And the fingerprints are checked so that there can be no possible mistake.

In order to study these fingerprints and get the greatest knowledge and beauty of the subject, they should be studied with a magnifying glass, and the ordinary magnifying glass which is used in the cotton mills for the purpose of counting the number of threads of cotton or linen is perhaps the best. The glass is placed immediately over the fingerprint. I am going to pass these particular illustrations of the footprints of the new-born baby and fingerprints of the mother around, with this glass for you to inspect. I think you will be very favorably impressed with what you will see.

There is no question in my mind that eventually the public is going to be interested in this subject because it is the one method of identification of an individual and there is nothing else like it in the world. This subject has advanced to such an extent that we find that at the present time the breeders of blooded cattle and high-grade dogs are taking prints of the noses and mouths of animals for the purpose of identification. Nature provides every human-being and every animal with some means of identification.

If any one here cares to have his impression taken I have brought my apparatus with me and I should be very glad to fingerprint anybody that cares to have me do so.

DR. BRICKLEY: Mr. President, Guests, and Fellow Members. I have been asked to relate some discoveries of identity in other ways than by fingerprinting. Within a week I got a man who had been overboard for more than a month and his hands had been eaten off by marine animals. How could we take care of that? Then, too, we get burned people whose hands and features have been entirely disfigured. What are we going to do with them?

I consider the teeth an excellent way of identifying a dead person for the teeth are present even if the person has been overboard a long while. But there are also other ways by which the medical examiners must carry on their work. Perhaps the easiest way of identifying an individual is by his height and weight and complexion and color of the eyes and dress; but sometimes, for example if they have been run over or in an explosion, we don't have many of those things remaining; their dress or their eyes may be gone and we have to resort to other means of identification.

One of the nicest jobs of identification I ever saw was a case that was worked out by Sergeant Harvey of Station 4 about two or three years ago. One morning a police officer on Beach Street near Harrison Avenue, was hanging around near the box and at ten minutes of eight he heard a cry, "Police! Help!" He located a Chinaman hanging from a fourth story window, calling "Help! Police!"

He tried the door and it was locked; he called a truck driver passing and said, "Have you a crowbar?" and the driver said, "Yes". "Give it to me," he said, and he stuck it in and broke the door open. He went upstairs and he heard scuffling; he went up one flight and he said to the truck driver, "You stay here", and he took his bar and paced the hall. The policeman went up another flight, and he still heard scuffling; he went up three flights and he heard more; he then kicked in the door of a room and he saw a little naked Chinaman with a knife in his head. All he could see of the knife was the handle, a lot of blood, and another Chinaman over

by the window. Four Chinamen one of whom was tall tried to pass him to go down the stairs, but he said "Stop where you are," and reiterated the command. He told them to get upstairs and they went upstairs. He said, "Get in here" and he pushed the four Chinamen into the room where he had this Chinaman who was stuck and he said, "The first one that moves I will plug him." He took his key off and dropped it out of the window and said, "Go to the box and get help". A crowd had gathered by that time and the people were hollering and someone notified the police and they came down from Lagrange Street and arrested the four Chinamen who had been upstairs, one Chinaman that was in the room and the man who had the knife in his head.

When the police came they said, "We will pull the knife out" but they didn't and couldn't. They took the injured Chinaman to the City Hospital, and the admitting physician said, "I will pull it out" and he couldn't. And two internes tried together to pull it out, and finally one put his knee against the head and pulled and it came out. The Chinaman was dead in an hour and they notified me. I met Sergeant Harvey and he said, "Here is the knife, Doctor." I said, "Is it marked" and he said "No". "Put your initial on it and I will put mine on, because some smart lawyer will get into this and we can say we initiated it." It was a boning knife such as a butcher uses. The blade was about seven inches long and the handle was ash and bolted on with three or four rivets and two rings at the end of it. I looked at the Chinaman and took the knife with me and in the autopsy put the knife through the skull hole. That knife had been driven in through the right parietal region.

If you hit with a repeated blow you will get wave lines, but with one blow you would get only one wave line. This blow had one wave line. I knew it was the knife because it was bloody and I had a mark and it was just the width, and so I had three points right there, and also its direction. I then said to the Sergeant, "Take this knife and go to some place that sells butchers' implements and ask who made it. Find out from the persons who made it, to whom they sold it." He went down to the market and found out where they got their knives. And he went to a maker, and they said, "We don't make that, so-and-so makes them." He went to so-and-so, a manufacturing concern up around Worcester. They said, "We have discontinued it, we don't make them." "To whom have you sold?" "We sold to—" and they gave four customers. He went to each of those in turn. On the third try he got the information sought and that dealer said, "Yes, I sold a job lot of those knives to a Chinese restaurant in Providence." He went to Providence and spoke to the Providence police, identifying himself as Sergeant Harvey.

They went to the restaurant, got the chef and showed him the knife and the chef said, "Yes, that is my knife. I have others" and he went to the closet and took out two similar knives. He said, "I bought four; one of them is broken and recently I missed one." The sergeant said, "Is there any man who was not here at such a time," naming the date and hour. The chef said, "Yes, there were certain men away, and three or four men were here." The sergeant asked if any of those men were in Boston at that time, and they were called in and said that none of them were.

When I entered the house I had noticed that the dead man was a fairly well educated Chinese. He had studied German and law and a curious thing was that the law book that he was studying was open. He had marked it and we found it about six feet from where his body had been found. That book was open at a case which held that an accessory to the crime of murder was equally guilty with the



murderer. We found a check book which showed a small deposit. That was strange for Chinamen usually have a lot of money. There had been some checks torn out. I took the check book with me. I told Sergeant Harvey to get a line on who the parties were that got the checks and he found that one fellow that had a check was a Chinaman down in a Providence restaurant. Then came the question of pinning it on him.

I said the man that used that knife was strong. This man was lying down when he got the blow. If he had been hit hard enough to drive that knife in as it was when he was lying on a hard surface it would have shown bruises on the left side. There was not a mark there. The body had been disturbed. It was on the bed. The head of the bed showed a clot on the area corresponding to the wound. I looked under the bed. The mattress had not been moved so the man's head was where it should have been.

From the cashier of the bank, Harvey got the name of the man that had the account; then he went back to the restaurant and found that so and so, giving the name of the man who had the check, was out on this date, and when he came back he said so and so is dead, naming this dead Chinaman on Harrison Avenue; and he had named it before even the police knew who the dead Chinaman was. He said I suppose they will suspect me because I had a check from him. He went to the cashier and said, "Give me the check I gave you last night." The cashier remembered that and he said, "No, the check has gone through, I can't give it to you. It went through in this morning's receipts." Then the police went to the Chinaman and asked him if he killed the man, and he said, "No, I did not do it." They knew the person that had done it had to get back from Boston to Providence at such a time and so Harvey went down to the South Station and said, "Who was on duty at the Providence train gate at such an hour?" He found the man and he said, "Did you notice a Chink at that time?" "Yes, he was a tall fellow and he didn't speak good English; he came here half running and said, 'Which is the train for Providence,' and I told him. So and so was with me." "What did he look like?" "He was tall." They went to Providence and checked him out of the restaurant and found that he had left Providence early in the morning, that he had looked at the train schedule, and because of delay had to wait there half an hour. They went to the train station in Providence and asked, "Did anybody see a Chinaman taking an early morning train?" The train left about five in the morning. Yes, a sweeper had seen him. He was in the dining room and when he wanted to work there he asked the Chinaman to step out. When asked what he looked like he said he was tall. "Did you see him again?" "Yes, I was eating my lunch at the time; I have my time off every morning at six; and when the train comes in which leaves from Providence to Boston, I saw him take that train."

That checked him up and checked him back. He had just thirty-five minutes to go from the scene of the murder down to the train to get away. He had less than fifty-five minutes in Boston to go up and get his man and then get back again to Providence. That man came to trial and a certain fellow who is here defended one of them and a certain other fellow that is absent defended another, and they put me on the stand and asked me questions as to how it could have happened. I told them the story as we had worked it out. Fingerprinting is all right, but nothing takes the place of down-right steady good work and persistency because in the absence of easy ways of doing it you must work. That was one of the nicest jobs I ever worked out, with everybody against us. We got our man.

The other case I was asked to speak about was another tracing of identity. Just recently one morning I was notified that the New York boat had brought in a man dead in a stateroom. The body came to Boston and I went down and took a look, and I said, "This man should not have died from any outstanding disease." They told me this story: "We heard nothing all night. In the morning we found the door locked. We obtained a key and entered the room and the man appeared to be dead. They called the police station and the doctor said if he is dead notify the medical examiner."

When I got there the man was lying peacefully in the lower bunk. His clothes were folded as a man would fold them who is used to travelling. His expression was peaceful. All the labels had been cut from his garments, even the label from the inside of the drawers was cut out. The tags showed lint of various kinds but nothing to correspond with the marks. On his middle and forefingers were fresh ink stains. His fingernails were trimmed. I thought, he is a careful man; doesn't work hard, had money at one time because he had an excellent bridge in his mouth. He had been out of luck recently for some of the facings were gone. I rolled the man over and some fresh blood came from his mouth. He had been poisoned apparently. He was in good health. It was evidently a case of suicide. It was not external violence.

About that time the steward said, "The boat sails at five o'clock; we must have the room at three." Everything I had to do must be done at once. I took the bed apart but didn't find anything. I took the pillowcases off and examined the mattress. The bunk above showed nothing. It was all made up, didn't have even a wrinkle in the bed. I took that apart and at the foot of that bed, on the inner side and under the mattress cover on top of the mattress was a small package. I took it out and found a surgical needle in a glass case and a small vial done up in a piece of paper. That paper had been written on. I examined him again, and went through all his clothes. There was only one small billfold and that had a ticket from New York in it and a corner of a ten-dollar bill, one nickel and one penny. The gloves and shoes were marked on the inside with names and numbers. There were laundry marks on the collars of three shirts. The outside collar was not marked. It was new. He was evidently of New York origin.

I did an autopsy. From the amount of blood, this man died slowly, while he was inhaling air; not strangled. The newspaper men were after me for a story and said, "What did he die of," and I said "I don't know."

William G. Thompson, counsel for Sacco and Vanzetti, called up and told us a client of his who was on the boat heard a noise of scuffling that night and several men talking loudly and then a door shut and somebody said, "There, that will hold you for some time" and thereafter it was quiet. The next morning I called the Homicide Bureau and said, "Help me on this, I think I have got something." Then a man who was staying at the Statler said he came over on the New York boat that night and he lived in Marblehead. He didn't want his name mentioned. He said that late last night there was a drinking party of several men on board and one of them was drunk and wanted to throw somebody overboard, and the rest held him and put him into the room, and he said that was the noise that had been heard. I didn't get the identity then. The next day I looked through all the clothes again. All I had was one green lead pencil marked the Casablanca Hospital. I got a book of hospitals and hunted up the Casablanca Hospital. We took a picture of this fellow, front and lateral, with glasses and without glasses. We had the glasses case. We



had his surgical syringe, an intravenous; we had the fingerprints on that case. He had put back the needle in its proper place and I knew it had been used afresh because the needle which held the glass had steam on it. It was moist. The outside showed some white substance. I set out to find out what that was. I had his fingers and I would know whether that was his syringe, still I could not say he used it or would not have a right to use it. Suppose he had a right to use drugs for heart condition; suppose he was using insulin. I didn't know. I looked for his wallet. It was lying so that the sun was shining on it, and it looked as if there was something on the middle portion of it. I said, "We will look at it under glass," and we made out the Dar, and ook ork and then we made out a Y with a dot behind it and we called it York and we made out Darmond or Barmond and the name turned out to be that of Dr. Bertram I. Darmond which I was able to locate, through a directory at the Massachusetts General Hospital, in Brooklyn, N. Y., a graduate of Baltimore Medical College in 1904. I had figured that he was a little over fifty. Then looking closely at the writing I could see West Second Street and I found that Dr. Darmond had an office at West Second Street in Brooklyn. The newspaper men and police were beginning to think we had a story, so I hid in a certain place and kept at work. Then I got word that a man from Lexington wanted to talk with me about the man that was found dead on the New York boat. I gave him my name and he commenced to talk and then somebody started plugging in and we knew that somebody was listening in at the Haymarket Exchange. They are pretty wise down there and I said, "I guess I better tell somebody who will help." So I called them in and gave them the story but I said, "I am not satisfied." I showed them the wallet and told them it contained the name and address of this man and they took it and said, "We don't see it." So I showed them how we had traced it out. They called up Brooklyn and then I got a report that this man left Brooklyn on such a date and he had written to his wife from whom he had run away sixteen or eighteen years before and he said, "You are the only person whom I can trust. Tonight at five o'clock I sail for oblivion and no one shall ever know who I am or where I came from or what means I have taken to enter that state."

Dr. Darmond was born in Casablanca, Morocco, the son of a Moor and a Spanish mother. He came here early in life and lived in Brooklyn. He graduated from the Baltimore Medical College and went to Ann Arbor where he met a young woman. They completed their studies and were married. They settled in Brooklyn and conducted a joint practice. They didn't hit it off very well and he decided to return to Morocco. They went to Casablanca and there conducted a hospital and got along very well for a time. Then his wife became a cripple and returned to America to obtain expert medical treatment. He then took on several wives without the formality of marriage and had one child at least, and probably more. He took some money from some Italians who were travelling with trachoma and led them to believe that he could get them into the country. They came, were discovered and deported. Before leaving Morocco he had left a power of attorney with his illegitimate wife and he found on returning that she had sold him out, and that was the last straw. He came here again and worked in a menial capacity and then studied for the New York State Board, took the examinations and failed and was discouraged. Then he said that he would go out in such a way that no one would be able to determine who he was or how he died.

That is a case of discovered identity by using all you had to work with. You could never have

done it by fingerprints alone. I will say that while fingerprints are excellent the medical examiner has to step up to things as they are, and we have many ways of discovering identity.

(To be continued)

# SUFFOLK DISTRICT MEDICAL SOCIETY

WILL MEET AT THE  
BOSTON CITY HOSPITAL, CHEEVER AMPHITHEATRE,  
WEDNESDAY, DECEMBER 28, 1927, AT 8:15 P. M.

## Medical Section—Program of Clinic

- 8:15-8:25—Plans and Progress of Hospital. Dr. John J. Dowling.
- 8:25-8:35—Preventive Inoculation Among Nurses at Boston City Hospital. Dr. George P. Sanborn.
- 8:35-8:45—(a) Teratoma Cyst of Buttocks. Dr. Martin J. English.
- (b) Gangrene of Leg (in 15 months child) associated with Heart Lesion. Dr. Otto J. Hermann.
- 8:45-8:55—Chronic Laryngeal Stenosis. Dr. Edwin H. Place.
- 8:55-9:05—Injuries of the Ankle. Dr. Frederic J. Cotton.
- 9:05-9:15—The Effects of Tonsillectomy on the Attack of Acute Rheumatic Fever. Dr. William H. Robey.
- 9:15-9:25—Suppurative Diseases of the Lung. Dr. Horace Binney.
- 9:25-9:35—The Thebesian System of the Heart and Its Relation to Angina Pectoris and Coronary Thrombosis. Dr. Joseph T. Wearn.
- 9:35-9:45—(a) Presentation of case of Thromboangitis obliterans complicating miscarriage. Dr. Nathaniel R. Mason.
- (b) Presentation of case of Malignant Disease of Vulva.

Refreshments in the Hospital library after the meeting.

GEORGE P. DENNY, M.D., *Secretary*.  
REGINALD FITZ, M.D., *Chairman*.

## NEW ENGLAND ASSOCIATION FOR PHYSICAL THERAPEUTICS

A regular meeting of the New England Association for Physical Therapeutics will be held at the Boston Square and Compass Club, 448 Beacon Street, December 21, at 8 o'clock.

### BUSINESS

Nomination of officers for ensuing year.  
Report of Committee for the year and especially the Convention.

### SCIENTIFIC SESSION

Electrical and Electro-magnetic waves with Radium, X-ray, Ultra Violet, Solar Spectrum, and Infra-Red and High Frequencies by J. Emory Clapp, Boston.

Dinner at 6 P. M.

Full attendance is important.

## NEW ENGLAND PEDIATRIC SOCIETY

The Annual Meeting of the New England Pediatric Society will be held at the Boston Medical Library on Friday, December 23, 1927, at 8:15 P. M.

1. The Report of the Council.
  2. The Report of the Treasurer.
  3. The following paper will be read: "Some Experiences with Tracheotomy," by Lyman Richards, M.D., Boston, Mass.
  4. Election of Officers.
- Light refreshments will be served after the meeting.

J. HERBERT YOUNG, M.D., *President*.  
THOMAS H. LANMAN, M.D., *Secretary*.

## SOCIETY MEETINGS

**December 15**—Boston Dispensary. Detailed notice appears on page 1113, issue of December 8.

**December 21**—New England Association for Physical Therapeutics. For complete notice see page 1159, this issue.

**December 23**—New England Pediatric Society. Detailed notice appears on page 1159, this issue.

**January, February, March and April, 1928**—Last Saturday at 11 A. M. Cheever Amphitheatre, Staff Clinical Meetings at Boston City Hospital.

## DISTRICT MEDICAL SOCIETIES

## Essex North District Medical Society

**January 4, 1928 (Wednesday)**—Semi-annual meeting at the Centre Church vestries, Main Street, Haverhill, at 12:30 P. M.

**May 2, 1928 (Wednesday)**—Annual meeting at 12:30 P. M.

**May 3, 1928 (Thursday)**—Censors meet for examination of candidates at Hotel Bartlett, 95 Main Street, Haverhill, at 2 P. M. Candidates should apply to the Secretary, J. Forrest Burnham, M.D., 567 Haverhill Street, Lawrence, at least one week prior.

## Essex South District Medical Society

**January 4, 1928 (Wednesday)**—Deer Cove Inn, Swampscott. Dinner at 7 P. M.

Dr. Frank Lahey, "Differential Points of Importance to the General Practitioner in Surgical Diagnosis."

Discussion by Drs. Walter Phippen of Salem and N. P. Breed of Lynn, 10 minutes each, and from the floor.

**February 1 (Wednesday)**—Council meeting, Boston.

**February 8 (Wednesday)**—Danvers State Hospital. Clinic at 4 P. M. Buffet supper at 6 P. M., followed by

Dr. Abraham Myerson, "Some Aspects of Mental Hygiene."

Discussion by Drs. W. F. Wood of Hathorne and G. M. Kline of Beverly, 10 minutes each, and from the floor.

**March 7 (Wednesday)**—Lynn Hospital. Clinic at 5 P. M. Dinner at 7 P. M.

Dr. Henry R. Viets, "The Acute Infections of the Nervous System," with lantern slides and moving pictures.

Discussion by Drs. W. V. McDermott of Salem and J. W. Trask of Lynn, 10 minutes each, and from the floor.

**April 11 (Wednesday)**—Essex Sanatorium, Middleton. Clinic at 5 P. M. Dinner at 7 P. M.

Dr. Raymond S. Titus, "Obstetrical Emergencies."

Discussion by Drs. J. J. Egan of Gloucester and A. T. Hawes of Lynn, 10 minutes each, and from the floor.

**May 3 (Thursday)**—Censors meet at Salem Hospital for the examination of candidates at 3:30 P. M. Candidates should apply to the Secretary, Dr. R. E. Stone, Beverly, at least one week prior.

**May 8 (Tuesday)**—Annual meeting. Place and speaker to be announced.

## Suffolk District Medical Society

Combined meetings of the Suffolk District Medical Society and the Boston Medical Library will be held at the Boston Medical Library, 8 The Fenway, at 8:15 P. M., as follows:

**December 28**—Medical Section. "Functions and Organization of the Boston City Hospital." Complete notice appears on page 1159, this issue.

**January 25, 1928**—General meeting in association with the Boston Medical Library.

Dr. George W. Crile, Lakeside Clinic, Cleveland, Ohio. Title to be announced later.

**February 29**—Surgical Section. Subject to be announced later.

**March 28**—Medical Section. "The Use and Misuse of Vaccines." Dr. Hans Zinsser, Dr. Francis M. Rackemann, Dr. Charles H. Lawrence.

**April 25**—Annual meeting. Election of officers. Paper of the evening to be announced later.

The medical profession is cordially invited to attend these meetings.

Notices of meetings must reach the JOURNAL office on the Friday preceding the date of issue in which they are to appear.

## BOOK REVIEWS

*Text Book of Bacteriology.* By WILLIAM W. FORD, M.D., W. B. Saunders Company, 1927. Pp. 1069.

The major portion of this text book is devoted to systematic bacteriology with complete

descriptions of the micro-organisms commonly encountered in medicine, comparative pathology and hygiene. In the present state of confusion of the subject it would be relatively difficult to present systematic bacteriology in its entirety.

A very careful discussion is devoted to the anaerobic bacteria. In addition the spirochetes have been included and a considerable amount of space is devoted to the filterable viruses.

The first section of the book devoted to general bacteriology considers morphology of the bacteria, methods of examination and culture, and a valuable chapter is devoted to the destruction of bacteria considering the various types of disinfectants.

This book is primarily a text book on the taxonomy of bacteria, giving a well-rounded view of the subject. Its chief value lies in the thorough and careful discussion of a wide range of the bacteria.

*Practical Methods in Venereal Diseases.* By DAVID LEES, F. R. C. S., Surgeon in charge of Venereal Diseases, The Royal Infirmary, Edinburgh; etc. Price \$5.00. 605 pages. New York: William Wood and Company, 1927.

A small volume devoted to the diagnosis and treatment of venereal disease. It is interesting to compare British methods with our own, and a satisfaction to read a book based on principles as sound as those of the author.

Chapters devoted to syphilis and gonorrhea give the reader a very clear survey of these common diseases and enter into the latest methods of treatment. Detailed schedules of the treatment of syphilis, including the administration of the newest preparations of arsenic, mercury and bismuth give the practitioner an excellent routine. The treatment of gonorrhea by vaccines is considered of more importance by the author than by the average American venereologist. A summary of the principles to be followed in treating gonorrhea is given in one of the last chapters as follows: "In the treatment of all gonococcal infection, whether acute, sub-acute, or chronic, it is essential to apply three forms of treatment:—

(1) Antiseptic and mechanical cleansing of the infected area.

(2) The establishment of free drainage from the site of the infection.

(3) The administration through the blood stream of a potent but non-toxic vaccine to stimulate and increase the patient's resistance to the infection.

Those methods, carefully applied, will give successful results in practically all cases of gonococcal infection of either male or female patients."

We strongly recommend Dr. Lees' book to the student of venereal diseases.